



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

TX 511.1 .M149
McHenry, M. W.
Arithmetical problems for supplementary

Stanford University Libraries



3 6105 04927 2540

ARITHMETICAL PROBLEMS

Mc HENRY & DAVIDSON.

60
48
—



SCHOOL OF EDUCATION
LIBRARY

TEXTBOOK COLLECTION

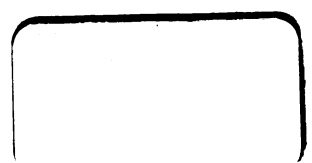
GIFT OF

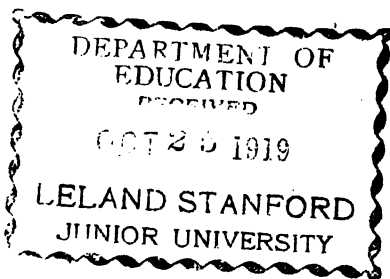
SANTA CLARA COUNTY

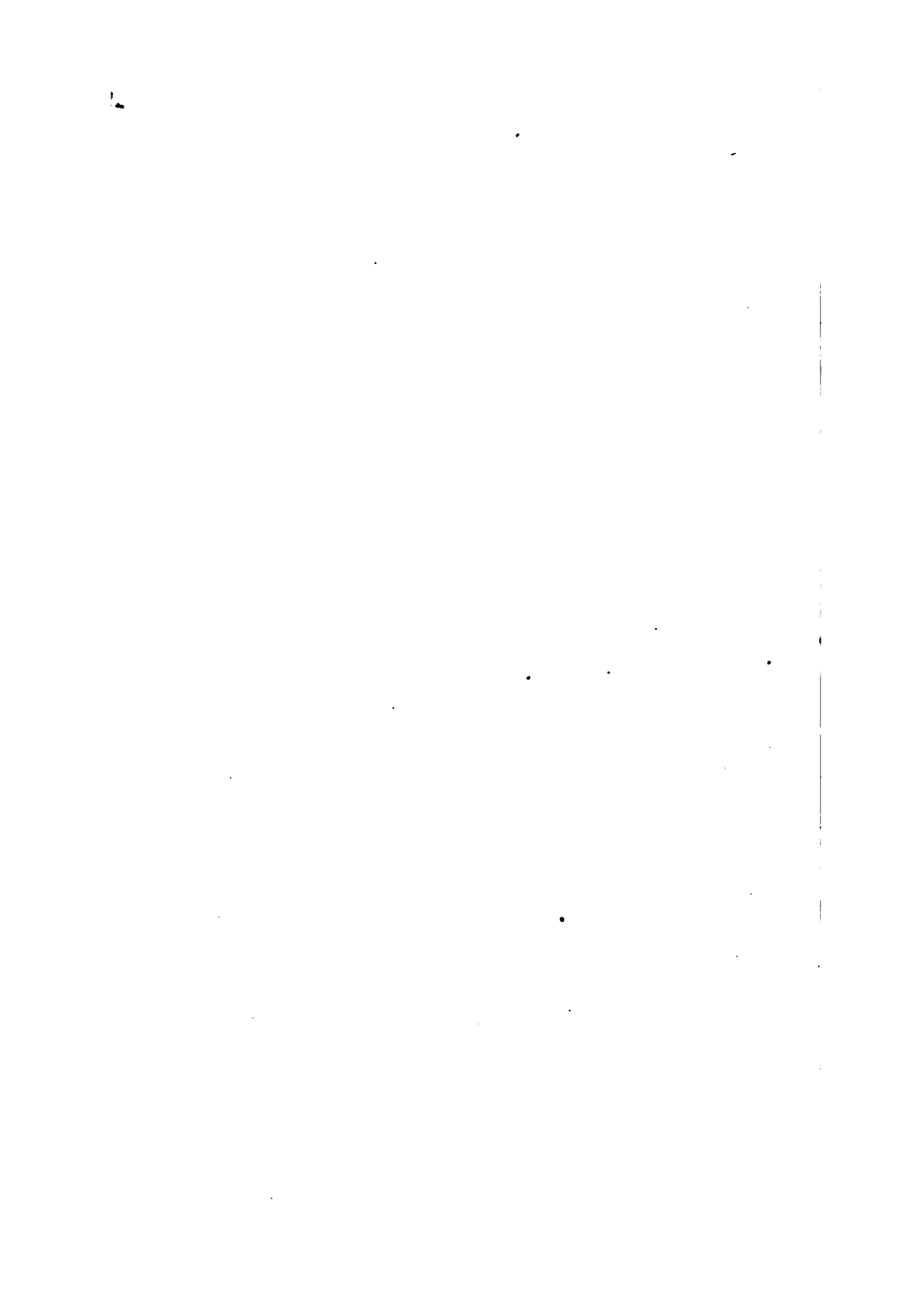
TEACHERS LIBRARY



STANFORD UNIVERSITY
LIBRARIES







Arithmetical Problems

FOR

Supplementary Work

BY

M. W. McHENRY

AND

R. F. DAVIDSON

PRINCIPAL OF THE H. B. DURFEE-SCHOOL DECATUR, ILL.



CHICAGO NEW YORK
THE WERNER COMPANY

J. W.

615220
C

COPYRIGHT, 1895, BY THE WERNER COMPANY

Arith. Prob.

PREFACE

THIS work has been prepared after repeated assurances that it is needed. The authors submit it to teachers and pupils with the hope that they will find it suited to their needs. It is not intended to supplant any text-book on arithmetic, but to furnish a variety of supplementary work to be used with any complete arithmetic.

An abundance of drill-work is provided to secure rapidity in the simple operations. An attempt has been made to break away from mechanical processes which require no reasoning on the part of the pupil.

The character of the problems are such that original thought and investigation are necessary. These features have been kept prominent throughout the work. The whole field has been covered where additional problems are deemed necessary, especially in the applications of Percentage and Mensuration so much in demand. Many of the best text-books in use have been consulted, and we have availed ourselves of help from every source, selecting the best features from many authors.

The work has been prepared with extreme care, and many hours have been spent in examination of libraries, in interviewing men of various vocations, in taking actual measurements, and in hunting up original material for the basis of the problems.

The arrangement and choice of material, the freshness in style, the avoidance of awkward fractions, the thoroughness with which the ground is covered in all points where mistakes are likely to occur, the care to emphasize oft-neglected principles, the extent of the work, and the painstaking care with which this work has been prepared, make us feel confident that this little work will commend itself to the good judgment of all thinking teachers.

Decatur, Ill., May, 1895.

THE AUTHORS.

CONTENTS.

Notation and Numeration	7-8
Addition.....	9-12
Subtraction.....	18
Addition and Subtraction.....	14-15
Multiplication	16-17
Division.....	18
Miscellaneous.....	18-28
Factoring, Divisors and Multiples.....	24-25
Cancellation.....	25-26
Applications.....	26-28
Reduction of Fractions.....	29-30
Addition of Fractions.....	30
Subtraction of Fractions	30
Addition and Subtraction—Applications	31-32
Multiplication of Fractions.....	32-38
Division of Fractions.....	38
Complex Fractions.....	38
Relation of Numbers.....	34
Miscellaneous Problems.....	34-38
Decimals, Notation.....	39
Reductions.....	40
Addition and Subtraction	40
Multiplication.....	40-41
Division.....	42
General Review.....	42-48
Commercial Transactions.....	48-45
Denominate Numbers.....	46-60
Reduction.....	46-47
Applications.....	47-50

Practical Measurements—Surfaces.....	51-54
Solids.....	54-55
Lumber.....	55-56
Masonry and Brickwork.....	57-58
Capacity.....	58-60
Percentage.....	61-65
Profit and Loss.....	66-68
Commission.....	69-71
Taxes.....	72-73
Interest—Exact Interest.....	74-75
Miscellaneous Problems.....	76-77
Annual Interest.....	78
Partial Payments.....	78-79
Compound Interest.....	79
True Discount, Present Worth.....	80-81
Bank Discount.....	81-83
Insurance.....	84-85
Stocks, Bonds and Brokerage.....	86-88
Exchange, Domestic.....	89-90
Foreign.....	90-91
Duties.....	92-93
Ratio and Proportion.....	94-103
Analysis—Models.....	94-96
Simple Proportion.....	96-97
Compound Proportion.....	97-98
Partitive Proportion.....	99-100
Conjoined Proportion.....	100-101
Partnership.....	102-103
Involution and Evolution.....	104-105
Applications of Square Root.....	105-107
Applications of Cube Root.....	107-108
Mensuration.....	109-112
Miscellaneous Problems.....	113-128

Arithmetical Problems

NOTATION AND NUMERATION.

1. Copy, point and read the following numbers :

1. 6894	11. 647873	21. 6507258069
2. 8068	12. 4896720	22. 380060590
3. \$20475	13. 9980468	23. 7400629006
4. \$847.53	14. 2869084	24. 5007043078
5. 7597682	15. \$807.40	25. 852969457
6. 90508	16. 4800054	26. 9000080007
7. 26040	17. 17003	27. 500500500
8. 59807	18. 6587230	28. 84760021
9. 8009	19. 99006	29. 490865346
10. \$275968	20. 470401	30. 8704558608

2. Write the following numbers in figures :

1. Four thousand six hundred seven.
2. Ten thousand eight hundred sixty-five.
3. Ninety-seven thousand six hundred eight.
4. Seven hundred twenty-four thousand forty-two.
5. Thirty thousand seventy-five dollars.
6. Six million eight hundred forty thousand fifty.
7. Two million three hundred one thousand four hundred.
8. Eight million nine thousand two hundred sixty-three.
9. Ninety-six billion six hundred eighty-seven thousand four hundred eighty-three.
10. Ten billion ten million ten thousand ten.
11. Ninety-four million seventy thousand ten dollars.
12. Seventy-eight thousand six hundred fifty dollars.

13. Eight hundred million nine hundred thousand seven hundred twenty dollars and eighty cents.

14. Three billion two hundred eighty million forty-six.

15. One hundred five million sixty thousand seven hundred eighty-nine.

16. Five billion eight million two hundred eleven.

17. Four hundred sixty million eight hundred forty.

18. One hundred sixty million ninety-four thousand.

19. Ten billion forty-one million six hundred twelve.

20. Seven trillion sixty thousand nineteen.

21. Twelve million two hundred forty thousand seven.

22. Four million sixty-six thousand two hundred five.

23. Seven hundred ninety thousand eighty-four.

24. Forty million four thousand seven hundred.

25. Eight million nine hundred thousand eighty-seven.

3. Write in words the following numbers :

- | | | |
|---------------|---------------|-----------------|
| 1. 4009687 | 6. 868064 | 11. 92000685104 |
| 2. \$768805 | 7. 4008002 | 12. 8930017000 |
| 3. \$80503072 | 8. 26019045 | 13. 6079058670 |
| 4. 700006095 | 9. 7000000800 | 14. 800000075 |
| 5. 81500241 | 10. 800094000 | 15. 17968842 |

4. Read and write in figures the following :

- | | | |
|-----------|---------------|---------------|
| 1. XII | 7. XLIX | 13. MDCCCXCIV |
| 2. XIX | 8. CLIV | 14. MDIX |
| 3. XXXIX | 9. CDLXV | 15. XCCXCV |
| 4. LVII | 10. MDCCLXXVI | 16. XXID |
| 5. LXXXIV | 11. DCCCL | 17. MMMDCLXVI |
| 6. CXXIV | 12. MIX | 18. VDLIX |

5. Write the following in Roman numerals:

80, 54, 78, 69, 28, 92, 85, 54, 106, 210, 150, 849, 557,
985, 1895, 2009, 24682, 780, 695, 5999, 1896, 500400.

ADDITION.

6. Add the following numbers :

I.	2.	3.	4.	5.
861	217	\$678	267	8456
168	548	478	489	4282
725	987	258	753	6849
643	695	345	524	5784
446	572	786	456	7889
6.	7.	8.	9.	10.
2728	245	519	52670	\$84
5446	464	271	221532	25.25
5565	879	745	99835	.98
6847	998	864	892763	9.125
9767	727	927	81676	18.964
II.	12.	13.	14.	
52670	\$84.	689	70466	
221532	25.25	847	95299	
90835	.98	775	80597	
892763	9.125	926	12673	
81676	18.964	897	33249	
725539	240.40	627	66768	
1467	13.146	879	34705	
13279	892.46	344	30359	
23842	500.63	777	15660	
81676	199.73	888	42248	
9879	495.78	985	86766	
725	63.47	949	63477	
1968	546.09	787	96865	
67254	87.125	797	34971	
80765	127.95	491	12773	
18826	375.16	769	10587	

15.	16.	17.	18.
281	\$ 7.10	76854	4922825
969	8.14	13687	9785476
799	.97	54578	3796478
698	6.20	75848	7644204
769	8.70	87578	4564658
858	24.80	18482	6996738
979	2.75	84387	9313685
857	4.87	21758	7248364
686	3.24	13242	6948493
978	7.90	28365	3174688
779	78.26	14189	5194046
488	31.06	82518	8758836
689	108.60	71812	7533579
847	44.50	54278	4924837
376	87.90	18351	6464578
497	78.92	91688	8420623
529	486.94	75432	9576784
393	172.68	47718	4239126
145	34.51	69617	7795875
678	19.27	54896	5841984
854	43.86	53573	6564212
286	57.50	81460	8915367

7. Add downwards and across:

					Total.
19.	468	716	945	159	491
	819	814	754	915	769
	1047	1497	634	748	563
	732	389	2872	367	726
	286	4765	1418	588	283
	547	231	754	694	989
	7219	978	846	373	1475
Total	.....	.....	.....	.....	.....

8. Find the total of each kind and for each day.

20.	Letters.	Reg. Let.	Postal Cds.	News- papers.	Pack- ages.	Books.	Total.
Mon.	9864	247	648	2464	287	172	.....
Tues.	2648	1886	967	1527	88	204	.....
Wed.	4928	975	325	14251	156	146	.....
Thur.	8175	1298	596	76826	329	245	.....
Fri.	2841	865	484	188577	195	89	.....
Sat.	4298	857	1298	65753	73	74	.....
Total	.....	.....	.....	.....	.....	...	.....

9. Add the following downwards and across :

21. \$	5482	2453	3621	4089	5809	7842
	1812	412	316	2312	2631	5400
	3526	5123	412	3492	47	7896
	1624	3384	8967	1512	836	508
	1612	3162	2125	1240	42	641
	2189	89	1321	7894	463	971
	6713	728	4006	5367	525	4529
	<u>2136</u>	<u>4852</u>	<u>2928</u>	<u>1536</u>	<u>2734</u>	<u>3052</u>

10. Weekly report of a circulating library:

22.	Mon.	Tues.	Wed.	Thu.	Fri.	Sat.	Total.
Fiction	865	796	943	717	795	1098	.....
History	324	433	230	659	542	358	.....
Biography	245	217	413	448	155	195	.....
Poetry	346	237	410	183	264	465	.....
Science	512	398	368	186	241	275	.....
Religion	<u>149</u>	<u>108</u>	<u>96</u>	<u>85</u>	<u>230</u>	<u>297</u>	.....
Total	...	...	...	...	...	...	.....

11. Find the sum of the following numbers:

23. From 226 to 240 inclusive.

SANTA CLARA COUNTY
TEACHERS' LIBRARY
No.

24. From 4559 to 4578 inclusive.
 25. From 8871 to 8890 inclusive.
 26. From 79487 to 79450 inclusive.
 27. From 97792 to 97806 inclusive.

12. Two-column addition at sight:

28. 28, 82, 44, 56, 88, 84, 48, 27, 17, 24.
 29. 26, 85, 18, 82, 17, 48, 87, 22, 88, 44.
 30. 87, 46, 55, 64, 78, 82, 91, 21, 82, 48, 54, 65.
 31. 47, 64, 88, 28, 78, 81, 18, 72, 27, 46, 78, 42.
 32. 52, 61, 48, 70, 84, 79, 25, 88, 14, 29, 97, 68.
 33. 46, 55, 64, 87, 78, 28, 82, 19, 91, 23, 84, 27.
 34. 87, 78, 64, 58, 46, 85, 27, 86, 72, 68, 21, 12.
 35. 19, 29, 89, 49, 59, 69, 79, 89, 99, 18, 28, 88.

36.	37.	38.	39.	40.	41.	42.
84	47	59	48	27	19	81.
27	56	68	78	86	29	82
68	78	77	85	49	89	88
48	88	86	69	58	49	84
89	79	95	47	87	59	85
57	47	21	98	68	69	86
28	58	82	44	49	99	87
64	86	48	29	52	18	88.
78	46	54	88	68	79	89
69	57	65	48	88	89	40
81	88	76	56	99	17	41
15	92	87	48	54	16	42
28	77	98	57	67	15	48
17	48	18	28	87	84	44
18	12	28	70	59	28	45
81	56	60	19	41	56	46
24	25	40	21	51	24	47
28	42	27	18	12	82	48

SUBTRACTION.**13. Find the difference of the following numbers:**

	1.	2.	3.	4.	5.
From	978	879	8769	\$8175	53413
Take	485	354	3257	\$2886	28501

	6.	7.	8.	9.
From	63528	74285	765004	40500
Subtract	14288	48886	476549	37254

10.	11.	12.
\$8300.38	97865481	60000000
\$5584.79	13256872	31045768

13. From 777777—89898 take 610000—188888.**14.** From 604075 take 476074—80019—67087.**14.** Subtract the second number from the first, then from the remainder, etc., till the last remainder is less than the second number:**15.** 7100008 and 1676456.**18.** 1000008 and 195679.**16.** 98674523 and 17547698.**19.** 10448046 and 1277054.**17.** 7935240 and 806421.**20.** 87465180 and 4082199.

	21.	22.	23.
From	\$697.07	\$1013.50	\$579.00
Take	{ 150.	{ 18 93	{ 40.10
	{ 48 50	{ 18.47	{ 34.00
	{ 12.	{ 7 74	{ 97.25
	{ 27.19	{ 81 98	{ 65.80
	{ 24 28	{ 8 69	{ 14.50
	{ 37.80	{ 2 84	{ 20.40
	{ 116.58	{ 26.00	{ 53.00
	{ 18.08	{ 42.18	{ 75.90

15. ADDITION AND SUBTRACTION :

1. The parts of a number are 128, 184, 872, 2357, 1409, and 769875. What is the number ?
2. Add \$76.95, \$456.28, \$89.81, \$65.25, \$79 72, \$78.78, \$90.80, \$70.89, \$819.78, \$65.25, and \$906.
3. Find the sum of the numbers from 495 to 514 inclusive.
4. The minuend is 98684 and the subtrahend 19678. What is the remainder ?
5. The remainder is 478964 and the subtrahend 764925, What is the minuend ?
6. From forty-nine million one thousand six hundred forty-five, take two million nine hundred seventy-eight thousand seven hundred sixty.
7. A man's deposits in a bank for a week were \$570, \$184, \$217.50, \$324, \$372.45, and \$610. He checked out \$260.25, \$346, \$500, and \$188.75. Find the balance in bank.
8. From two million nine, take three hundred thousand thirty-five.
9. From $\overline{\text{VDLXIX}}$ take $\overline{\text{MMDCCCLXV}}$.
10. What is the difference between 705 billion 96 million 6 thousand 5, and 208 billion 107 million 61 thousand?
11. Which is the larger and how much, London pop. 4764000 or the five largest American cities, New York, pop. 1,513,501, Chicago, pop. 1,098,576, Philadelphia, pop. 1,044,894, Brooklyn, pop. 804,877, and St. Louis, pop. 450,254?
12. The sum of two numbers is 60,908,072; the less is 21090806; what is the greater?
13. How many days from March 10 until Nov. 20 ?
14. Subtract 564088 from 4,000,000 as often as you can. What is the last remainder ?

15. ✓ Four men owned 1976 hogs. A owned 278, and B owned 490. C owned as many less than B as B did more than A. How many did D own? 230

16. A has \$2472; E has half as much less \$288; F has \$225 less than both A and E; and I has \$896 less than the other three. How much have all?

17. What two numbers equal 4874 and differ by 1076?

18. A majority of 800 of the voters at an election promised Mr. W. their votes; but he was defeated by a majority of 982. How many failed to keep their promise?

19. $\overline{\text{MMXIV}} + \overline{\text{CXIX}} - \overline{\text{XLIII}} + \overline{\text{MDCVII}} - \overline{\text{MDCXLV}}$.

20. What number must be added to 109 thousand eight, to make 19 million 68 thousand 140?

21. Take 995 from each of the following numbers: 568, 2768, 1024, 576, 848, 10021, 8200, 498, 1000. Add the remainders.

22. A broker lost \$27000 in mining stock, then gained \$28625, and then lost \$88500, which exhausted his capital; what was his capital?

23. ✓ If a dry-goods merchant increased his gains each year, on an average, \$4562 for six successive years and the last year his gain was \$86495, what were the gains for the whole 6 years?

24. Find the difference between the largest and the smallest number that can be expressed by the nine digits.

25. ✓ Two men had \$979 between them, and the difference between their shares is \$145; what sum has each?

26. How much taken from the sum of 9562 and 5875 will leave the difference of these two numbers?

27. From what number may 25, 18, and 20 each be taken separately and the remainders add 60?

MULTIPLICATION.

16. Multiply—

1. 4692475 by 5; 85; 276; 878; 986.
2. \$5624078 by 7; 64; 482; 98; 2008.
3. 68907488 by 9; 58; 647; 707; 987.
4. \$2578.25 by 6; 78; 845; 890; 6008.
5. 859007 by 9; 86; 754; 8026; 40700.
6. 987400 by 80; 900; 8700; 7600; 97840.
7. 7589647 by 18; 49; 971; 1892; 48068.
8. 597806 by 756428; 9482657; 988998.

17. Table of aliquot parts :

Parts of 10: $2\frac{1}{2}=\frac{1}{2}$; $8\frac{1}{3}=\frac{1}{3}$; $5=\frac{1}{2}$; $6\frac{2}{3}=\frac{2}{3}$; $7\frac{1}{2}=\frac{1}{2}$.

Parts of 100: $12\frac{1}{2}=\frac{1}{8}$; $25=\frac{1}{4}$; $37\frac{1}{2}=\frac{3}{8}$; $50=\frac{1}{2}$; $62\frac{1}{2}=\frac{5}{8}$;

$75=\frac{3}{4}$; $87\frac{1}{2}=\frac{7}{8}$; $16\frac{2}{3}=\frac{1}{3}$; $88\frac{1}{3}=\frac{1}{3}$.

Parts of 1000: $125=\frac{1}{8}$; $250=\frac{1}{4}$; $500=\frac{1}{2}$; $750=\frac{3}{4}$; $166\frac{2}{3}=\frac{1}{3}$; $833\frac{1}{3}=\frac{1}{3}$; $666\frac{2}{3}=\frac{2}{3}$.

Multiply by aliquots:

9. 45392 by 25; $12\frac{1}{2}$; $6\frac{1}{2}$; 75; 250.
10. 284358 by $8\frac{1}{3}$; $88\frac{1}{3}$; $66\frac{2}{3}$; $833\frac{1}{3}$; 50.
11. 842420 by 125; $16\frac{2}{3}$; $62\frac{1}{2}$; 875; 500.
12. Multiply 1728 by each of the following: 25, 50, 75, $12\frac{1}{2}$, $87\frac{1}{2}$, $62\frac{1}{2}$, $87\frac{1}{2}$, $16\frac{2}{3}$, $88\frac{1}{3}$, 750, $666\frac{2}{3}$.
13. Multiply each of the following numbers by 11: 84, 72, 45, 68, 81, 90, 67, 89, 78, 435, 568, 298, 527, 2185, 81462, 964857.

14. Multiply 846780 by 19; 49; 99; 899; 898; 690.

NOTE.— $579 \times 99 = 579 \times 100 - 579$.

Multiply 465 by 246; 578 by 654.

465	578
246	654
<u>2790</u> = 465×6	<u>3438</u> = 578×6
<u>11160</u> = $465 \times 24(6 \times 4)$	<u>30942</u> = $578 \times 54(6 \times 9)$
<u>114890</u>	<u>874742</u>

Multiply—

15. 8728 by 287; 819.
16. 4986 by 158; 857.
17. 4876 by 728; 567.
18. 5098 by 186; 455.

Multiply—

19. 4726 by 828.
20. 5769 by 864.
21. 7098 by 864.
22. 9847 by 818.

Multiply—

23. 825 by 10; 100; 10000. 4775 by 1000; 100000.
24. 82000 by 20; 80; 700; 84000; 107000.
25. 8760 by 40; 2200; 876000; 490000.
26. 705000 by 960; 88000; 460000; 90800.

NOTE.—Multiply 86 by 84. (Notice that the tens are alike and the sum of the units is 10.) $6 \times 4 = 24$, the first two figures of the product, and $8 \times (8+1) = 12$, the last two figures; hence, $86 \times 84 = 1224$.

Multiply—

- | | | |
|--------------------|--------------------|----------------------|
| 27. 24×26 | 31. 85×85 | 35. 112×118 |
| 28. 42×48 | 32. 33×37 | 36. 105×105 |
| 29. 57×53 | 33. 46×44 | 37. 128×122 |
| 30. 61×69 | 34. 92×98 | 38. 104×106 |
39. Multiply 5674892 by 18; 17; 19; 14; 18; 16; 15.
40. Multiply 158648 by 41; 71; 91; 51; 81; 61.

Illustration—

2386×14	86421×51
9544	182105
<u>39404</u>	<u>1857471</u>

What cost—

41. 85 yd. cloth at \$2 a yd.? 45. 92 yd. silk at \$1.20 a yd.?
42. 118 yd. cloth at \$2 a yd.? 46. 86 hats at \$1.75 each?
43. 72 tons coal at \$2 a T.? 47. 96 umbrellas at \$1.88 $\frac{1}{2}$?
44. 48 sacks flour at \$1 a sack? 48. 96 lb. butter at 25c a lb.?

Find the value of—

49. 882 qt. milk at 6c. 52. 418 bu. onions at 98c.
50. 198 doz. eggs at 16c. 53. 845 bbl. apples at \$2.70.
51. 220 lb. cheese at 18c. 54. 184 bu. quinces at \$1.55.

DIVISION.

18. Divide—

1. 5,080,320 by 3; 5; 9; 7; 8; 24; 96; 864.
2. 1,921,374 by 7; 6; 9; 13; 23; 91; 391; 702.
3. 8,454,656 by 8; 7; 14; 56; 224; 896; 1792.
4. 8,901,207 by 7; 9; 23; 207; 161; 1449; 6143.
5. 7,072,560 by 5; 16; 99; 898; 2679; 16074.
6. 54,892,625 by 5; 45; 175; 815; 6907.
7. 6237806784 by 890098. 137892150 by 55714.
8. 100966 by 700. 876040 by 1500. 57855 by 13800.
9. 178660075 by 457000. 963,888,000 by 516000.

Divide by resolving the divisor into factors:

10. 159768 by 36; 72; 126; 168; 252; 634.
11. 862880 by 24; 30; 120; 144; 432; 504.
12. 2985984 by 72; 108; 288; 576; 1729.

Divide by aliquots:

13. 6396000 by 5; 25; $37\frac{1}{2}$; 75; $62\frac{1}{2}$; $66\frac{2}{3}$.
14. 5880000 by $12\frac{1}{2}$; 125; 375; 625; 875; 50.
15. 75649500 by 10; 100; 1000; 50; 500; 750.

What is the value of—

16. $(684 - 88) - \overline{684 - 320} + 8 \times 75$
17. $85 + 9 \times \overline{(20 + 15)} \times \overline{(60 - 48)} \times 10 - 37641$?
18. $240 \times \overline{(16 \times 4 - 15 \times 3)} + \overline{(92 - 18 \times 4)} - 4280$?
19. $450 + \overline{(34 - 19)} \times 5 \div \overline{(90 \div 6)} + \overline{(8 \times 11 - 18)}$?
20. $732 \times 6 \div \overline{(15 \times 24 \div 9 \times 10)} + \overline{(42 \times 234 \div 26)}$?

19. Miscellaneous Exercises.

1. How many feet in the polar diameter of the earth, 7899 miles? The equatorial diameter, 7925 miles? The circumference, 24899 miles?

2. How many feet longer is the equatorial diameter than the polar?

3. \ The multiplier is 789 and the product is 671012; what is the multiplicand?

4. \ The dividend is 774468, and the quotient is 852; what is the divisor?

5. \ What is the average of the following numbers: 74, 210, 96, 48, 195, 280 and 271?

6. What is the average size of the following states: New York, area 49,170 square miles; Pennsylvania, 45,216 square miles; Illinois, 56,650 square miles; Ohio, 41,060 square miles; Texas, 265,780 square miles; California, 158,860 square miles?

7. The population of the above states in the same order is as follows: 5997853, 5258014, 3826351, 3672316, 2235523, 1208180. What is the average population per square mile?

8. What number multiplied by 5999 and divided by 7644 will give 857?

9. \ Divisor 587; quotient 8723; remainder 379; find the dividend.

10. \ What must be taken from 8750681 that it may be exactly divisible by 298?

11. Multiply the largest number that can be expressed by 6, 7, and 9 by the smallest number that can be expressed by the same figures.

12. Take the product of 978 by $7 \times 8 \times 9$ from the product of the sum of the numbers from 275 to 284 inclusive by the sum of the odd numbers from 78 to 96.

13. Find the sum of all numbers ending in 957 between 59914 and 68999, and subtract that sum from the sum of the numbers ending in 987 between 71886 and 82325.

14. The value of 9 horses and 8 mules is \$8244; now if the value of each horse is \$196, what is the value of each mule?

SANTA CLARA COUNTY
TEACHERS' LIBRARY

No. _____

15. A speculator gained one year \$8286, the next year he lost twice as much as he had gained and the next year he gained three times as much as he had lost, and then had \$75000; with how much capital did he begin?

16. Mr. G bought a farm of 160 acres at \$68 an acre, \$2270 down and the balance in 6 yearly payments; how much must he pay each year?

17. J and H had each \$24950; J loaned H \$8060 and then borrowed of him \$16845, and lost so much on the "board of trade" that H had \$6200 more than J; how much did J lose in speculation?

18. Mr. N bought a house for \$9518, and paid for it in yearly installments of \$1057; how many years were required to pay for the house?

19. What is the difference in the cost of 274 head of cattle at \$88.50 a head, and 1398 head of sheep at \$5.75 a head?

20. Multiply 3 by 3, then 9 by 9, then that square by itself, and so on until the product contains eight figures.

21. If 34638 persons cross a bridge daily, how many cross in July, Aug. and Sept.?

22. A man having an estate of \$458970, bequeathed \$42300 to each of his two sons, \$8560 to each of his three daughters, to his widow as much as to all the children, and the remainder to a university; how much did the university get?

23. What is the value of 624 pails of berries, each pail holding half a peck, at 6 cents a quart?

24. If 645 be subtracted 479 times from a certain number the remainder is 394; find the number.

25. The dividend is 5094692, the quotient 508, the remainder 4979 less than the divisor; find the remainder.

26. The quotient is 12 times the remainder; the divisor is 9 times the quotient; find the dividend, the remainder being 78.

27. If 187 be added to the dividend the quotient is 245, and when 841 is subtracted from the dividend the quotient is 241; what is the divisor?

28. The product of the sum and difference of two numbers is 687, and the difference is 13, what are the numbers?

29. √ Bought 1820 acres of land at \$85 an acre, and sold it in 160 acre farms, receiving for all \$68598; how much did I gain or lose?

30. A newsboy buys 168 papers each day at 20 cents a dozen and sells them at 5 cents each. At the end of the week he has 54 old papers on hand; how much has he made during the week?

31. What number is that to which if 379 be added, from the sum 522 be subtracted, the remainder multiplied by 6, and the product divided by 17, the quotient will be 488?

32. The vats in a tannery whose aggregate capacity is 27000 gallons are filled by two pipes, one discharging 250 gallons per hour and the other 290 gallons per hour; but they leak $1\frac{1}{2}$ gallons per minute; how long will it take to fill the vats?

33. A laborer whose wages are \$1.875 a day, works 26 days for a month; his expenses are \$22.75 a month; how long will it take him to save \$741?

34. The revised edition of 5600 copies of a 960 page book cost \$2625; what was the cost per page for stereotyping, if the presswork cost \$125, the paper $12\frac{1}{2}$ cents a copy, and the binding 15 cents a copy?

35. You having a \$10 bill, a silver dollar, and three ten-cent pieces wish to pay \$4.40; the collector has \$7 in bills, three twenty-five cent pieces and a five cent piece; how can change be made?

36. An agent sold three farms. For the first he received \$2876, for the second a half more than for the first, and for the third, four times as much as for the other two; what did he get for all?

37. A and B are 1826 miles apart and approach each other, A traveling 15 miles an hour and B 18 miles an hour; in how many hours will they meet?

38. Mr. G invested \$17442 in N. R. R. stock and sold a part of it for \$8268 at \$53 a share, losing \$4 on a share; but later stock advanced and he sold out at a gain on the whole transaction of \$4926; for how much did he sell a share?

39. If you have no change except a 25-cent piece, a 50-cent piece and a \$10 bill, how can you pay a bill of \$6.65 if the collector has only two 10-cent pieces and several \$2 bills?

40. A mechanic earns \$90 a month and his expenses are \$784 a year; how long will it take him to pay for a property worth \$2516?

41. A laborer receives \$28 a month and board for 8 months of the year; the rest of the year he is idle and pays \$15 a month for board; allowing him \$56 a year for other expenses; how much can he save in 4 years?

42. Bought 54 head of cattle at \$24. a head, and paid cash \$531 and the remainder in sheep at \$4.25 a head; how many sheep were required to balance the debt?

43. A book agent bought 118 books at \$3.25 each; he sold them at \$5.50 each; his expenses were \$19.70. He was unable to collect for 8 books. How much did he gain or lose?

44. On the day before Thanksgiving a huckster sold twice as many turkeys as ducks, and three times as many chickens as both ducks and turkeys; the ducks sold at 40 cents each, the turkeys at \$1.25 each, and the chickens at 45 cents each, and the whole amount received was \$90.85; what was the number of each sold?

45. A restaurateur counting the coin received one day found it to amount to \$94.50, one ninth being in half dollars, and the rest made up of an equal number of quarter dollars and dimes; how many pieces were there of each kind?

46. A clothier bought 96 overcoats at \$16.85 each; he sold half of them at \$24 each, and the others he sold in a job lot for \$720. How much did he gain or lose?

47. A train leaves Chicago at 12 o'clock noon at 38 miles an hour; another train leaves at 2:30 p. m. at 48 miles an hour; when will the fast train overtake the slow, and how far from Chicago?

48. How many times may the difference between 3967 and 9475 be taken from 17 times the sum of 94276 and 84883, and leave a remainder of 62883?

49. In a drawer are \$10 bills, \$5 bills and \$1 bills, an equal number of each; when the tens are taken out \$78 remains; when the fives are taken out \$148 remains; and when the ones are taken out \$195 remains. How many bills of each kind are in the drawer?

50. A census-taker listed 445 names during the day; at one house out of every three, he listed 5 names; at ten houses he found no one at home; at half the remaining houses he listed 6 names; and at the remainder the average was 8 each; at how many houses did he call?

51. How much more is $6789 + 89687 + 96948$ than $8796 - 7694 + 8978$?

FACTORING.

20. Tell whether or not each of the following numbers is divisible by each of the nine digits, except 7, and give the reasons.

- | | | |
|-----------|------------|--------------|
| 1. 26440 | 4. 1728960 | 7. 75681048 |
| 2. 94878 | 5. 889768 | 8. 187696421 |
| 3. 485864 | 6. 1782945 | 9. 48675790 |

Miscellaneous Drills.

10. Learn the squares of all numbers to 25.
11. Write the prime numbers to 100.
12. Write the composite numbers to 100.
13. Write the prime numbers from 100 to 200.
14. Write the composite numbers from 100 to 200.

Find the prime factors of each of the following numbers.

- | | | | |
|----------|----------|----------|-----------|
| 15. 148 | 20. 168 | 25. 8150 | 30. 10961 |
| 16. 885 | 21. 1184 | 26. 1089 | 31. 9817 |
| 17. 1865 | 22. 756 | 27. 8465 | 32. 5248 |
| 18. 1260 | 23. 2780 | 28. 1078 | 33. 25824 |
| 19. 256 | 24. 1728 | 29. 1457 | 34. 41827 |

NOTE.—Any root of a number, when it is a perfect power, may be found by factoring the number and separating the factors into two similar groups for the square root, or three similar groups for the cube root. Thus: $64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$; $64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$.

35. Find the square root of the following numbers by factoring: 16; 100; 256; 824; 625; 1089; 1764; 5929.

36. Find the cube root of the following by factoring: 27; 125; 216; 512; 1728; 4096; 9261.

37. Find all the integral roots of the following: 16; 256; 4096; 50625; 8096; 15625.

Finding Divisors.

38. Find all the divisions of 48; 72; 100; 60; 105; 144; 860.

39. How many divisors has 240? 810? 1728?
40. Resolve 248 into factors, one of which shall be three times the other.
41. Find the sum of the prime number between 10 and 100.
42. What is the smallest prime number that can be expressed by three figures? Four figures?

Find the g. c. d. of the following:

- | | |
|---------------------|-----------------------|
| 43. 86, 48, 54. | 47. 256, 480, 1296. |
| 44. 210, 315, 525. | 48. 2041, 8476. |
| 45. 252, 336, 420. | 49. 584, 1095, 2044. |
| 46. 590, 826, 1062. | 50. 1650, 1920, 4125. |

Find the l. c. m. of the following:

- | | |
|-----------------|--------------------|
| 51. 16, 24, 56. | 54. 14, 15, 36. |
| 52. 36, 48, 84. | 55. 4087, 4757. |
| 53. 18, 24, 27. | 56. 7, 11, 16, 80. |

Find the g. c. d. and the l. c. m.

57. Find the g. c. d. and the l. c. m. of 24, 36 and 120; 280, 322 and 506; 292, 1095 and 2044.
58. What is the smallest multiple of 3 and 7 that can be expressed by three figures?
59. What is the least number of which 3, 5 and 11 are factors? 2, 3, 5, 7 and 8?
60. Find the least number which, divided by 13, 15, 17 and 18 will give a remainder of 11 in each case.
61. Find the greatest number that will divide 1261 and 2072 and leave the remainders 41 and 59 respectively.

Cancellation.

62. Divide $48 \times 9 \times 20$ by $12 \times 8 \times 10$.
63. Divide $42 \times 18 \times 60 \times 82$ by $7 \times 24 \times 64 \times 2$.
64. Divide $225 \times 320 \times 65$ by $16 \times 150 \times 26$.

-
65. $225 \times 84 \times 198$ divided by $125 \times 63 \times 54 = ?$
66. $400 \times 18 \times 30 \times 42$ divided by $270 \times 20 \times 80 \times 14 = ?$
67. Divide $192 \times 117 \times 91 \times 57$ by $26 \times 123 \times 72 \times 65$.
68. How many chickens at 75 cents a pair will pay for 65 yards of muslin at 15 cents a yard?
69. A miller bought 24 loads of wheat, each containing 750 bushels, at \$.90 a bushel, and gave in exchange 16 loads of flour at \$6.75 a barrel, how many barrels were there in a load?
70. How many bushels of peaches at \$1.50 a bushel will pay for 80 days labor at \$1.20 per day?
71. How much must a tailor get for each of 270 suits made from 86 pieces of goods, each containing 44 yards, worth \$1.80 per yard, that he may incur no loss, allowing \$6 a suit for making?
72. An equal number of bushels, each of corn, at 42 cents per bushel, and wheat at 66 cents per bushel, were given in exchange for 15 pieces of cloth, each containing 48 yards, at 39 cents a yard; how many bushels of each were required?

Applications of g. c. d. and l. c. m.

73. What is the least sum of money with which I could buy either pigs at \$4, calves at \$7, cows at \$40, or mules at \$75?
74. A land speculator has four tracts of land containing 350 acres, 490 acres, 630 acres, and 560 acres respectively. If they are divided into equal farms of the largest size possible how many farms will there be and of what size?
75. What is the smallest tract of land that can be divided into fields either of 24, 30 or 36 acres each?
76. A can dig 5 rods of ditch in a day, F 8 rods, G 12 rods, and H 15 rods; how many rods will be required to give an exact number of days' work for each?

77. A dealer in real estate has three pieces of land fronting on a new street, as follows: 730 ft., 876 ft., 1095 ft. If they are cut into lots of equal width, the widest possible, what will be the width of a lot and what are all worth at \$290 each?

78. A, B, C, and D start to travel around a circular island 60 miles in circumference; A goes 12 miles a day, B 15, C 20, and D 24; in how many days will all meet at the starting point?

79. The g. c. d. of two numbers is 5, the l. c. m. is 30, what are the numbers?

80. What two numbers between 11 and 66 have the former for their g. c. d. and the latter for their l. c. m.?

81. Find all the numbers whose g. c. d. is 35 and whose l. c. m. is 2310.

82. The l. c. m. of 6 and 8 and a number prime to each of them is 168; what is the number?

83. Three boys are hoeing corn. J hoes a round in 18 minutes, W in 20 minutes, and H in 15 minutes. They start even at 10 o'clock and agree not to go to dinner till they come out even. At what time did they go to dinner, and how many rows did each hoe?

84. What is the smallest sum of money for which I can hire workmen at 12, 14, 16, 18, and 20 dollars per week?

85. A miller wishes to put 728 bushels of oats, 910 bushels of corn, and 1274 bushels of wheat into bins of uniform size, what is the capacity of the largest bin that may be used, filling each, and how many bins are required?

86. A wholesale grocer employs 5 traveling salesmen who cover their territory, respectively, in 2, 3, 4, 5, and 6 weeks, and are immediately sent out again, in how long a time will all meet at the wholesale house?

87. The circumference of the fore and hind wheels of a wagon are 12 and 15 ft. respectively; a bolt head on the tire of each was on top when the wagon started; how far will the wagon have gone when the bolt-heads shall be uppermost for the 264th time?

88. How much oftener would the bell on an oil wagon ring in driving 6 miles, if attached to the fore wheel of the wagon whose circumference is 11 ft., than it does when attached to the hind wheel whose circumference is 14 ft., the bell ringing once for each revolution of the wheel?

89. Two trotting horses, "Flyer," whose time is 2:30, and "Speedy," whose time is 3:00, start together on a mile track; how long will it take "Flyer" to gain a mile on "Speedy"?

90. How many rails will it take to make a fence, without worm, 8 rails high, and what must be the greatest length if they overlap 1 ft., to fence a triangular field whose sides are 482, 675, and 585 ft., respectively?

91. The sum of two numbers is 598; their common factor is 18; the difference between the other two factors is 12; what are the numbers?

92. Show that the number 1,081,080 is exactly divisible by all the numbers from 2 to 16 inclusive.

93. Two men use their canes to measure the distance (evidently less than 100 ft.) between two trees. The one cane is 31 inches and the other 33 inches in length, and each measures the distance exactly. How far apart are the trees?

94. The difference between two numbers is 306; their common factor 17; the sum of the other two factors 56; what are the numbers?

FRACTIONS.

21. Exercises and Problems in Fractions.

Change the following to improper fractions:

- | | | | |
|----------------------|-----------------------|---------------------------|--------------------------|
| 1. $4\frac{2}{3}$. | 6. $768\frac{2}{3}$. | 11. $89\frac{1}{11}$. | 16. $325\frac{1}{23}$. |
| 2. $12\frac{3}{4}$. | 7. $218\frac{1}{2}$. | 12. $394\frac{40}{55}$. | 17. $14\frac{284}{50}$. |
| 3. $7\frac{3}{7}$. | 8. $26\frac{9}{13}$. | 13. $68\frac{77}{1000}$. | 18. $81\frac{1}{221}$. |
| 4. $24\frac{5}{7}$. | 9. $35\frac{1}{5}$. | 14. $365\frac{10}{55}$. | 19. $144\frac{1}{5}$. |
| 5. $27\frac{1}{8}$. | 10. $98\frac{1}{2}$. | 15. $42\frac{2}{107}$. | 20. $288\frac{19}{73}$. |

Reduce to whole or mixed numbers:

- | | | | |
|---------------------------|--------------------------|-------------------------|----------------------------|
| 21. $\frac{35}{7}$. | 26. $\frac{7284}{123}$. | 31. $\frac{273}{14}$. | 36. $\frac{7428}{251}$. |
| 22. $\frac{897}{25}$. | 27. $\frac{724}{23}$. | 32. $\frac{496}{25}$. | 37. $\frac{2664}{1007}$. |
| 23. $\frac{97}{15}$. | 28. $\frac{96}{13}$. | 33. $\frac{278}{40}$. | 38. $\frac{9872}{472}$. |
| 24. $\frac{7215}{136}$. | 29. $\frac{335}{17}$. | 34. $\frac{3827}{43}$. | 39. $\frac{8372}{431}$. |
| 25. $\frac{10099}{100}$. | 30. $\frac{842}{21}$. | 35. $\frac{4000}{95}$. | 40. $\frac{85401}{3163}$. |

Reduce to their lowest terms:

- | | | | |
|-------------------------|---------------------------|---------------------------|----------------------------|
| 41. $\frac{39}{100}$. | 46. $\frac{291}{1067}$. | 51. $\frac{324}{180}$. | 56. $\frac{2023}{15589}$. |
| 42. $\frac{57}{190}$. | 47. $\frac{1111}{1414}$. | 52. $\frac{336}{210}$. | 57. $\frac{2340}{2520}$. |
| 43. $\frac{117}{273}$. | 48. $\frac{845}{1245}$. | 53. $\frac{528}{1004}$. | 58. $\frac{1785}{1880}$. |
| 44. $\frac{69}{230}$. | 49. $\frac{195}{405}$. | 54. $\frac{1209}{2821}$. | 59. $\frac{4808}{1784}$. |
| 45. $\frac{84}{144}$. | 50. $\frac{735}{630}$. | 55. $\frac{216}{360}$. | 60. $\frac{8899}{10157}$. |

Reduce—

61. $87\frac{1}{2}$ to 4ths. 65. $\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{7}{12}$, and $\frac{9}{20}$ to 60ths.
62. $\frac{1}{3}$ to 84ths. 66. $\frac{30405}{5728}$ to a mixed number.
63. $\frac{1}{7}$ to 117ths. 67. $\frac{57512}{133}$ to integers.
64. $1\frac{1}{2}$ to 357ths. 68. $\frac{81}{100}$ to a simple fraction.
69. Reduce $\frac{1}{2}$ to a fraction whose denominator is 2756.
70. Reduce $\frac{3}{4}$ to a fraction whose numerator is 416.
71. Simplify $\frac{1}{2}$ of $\frac{2}{3} \times \frac{3}{4} \times \frac{5}{6}$ of $\frac{6}{8}$.
72. Reduce $2\frac{3}{4}$ to 10ths.

73. $\frac{3}{8}, \frac{5}{8}, \frac{1}{2}$. 76. $6\frac{1}{2}, 5\frac{3}{8}, 11\frac{1}{4}$. 79. $1\frac{3}{4}, 1\frac{1}{2}, 6\frac{3}{8}$.
74. $\frac{3}{8}, 1\frac{7}{8}, 1\frac{1}{2}$. 77. $7, 1\frac{1}{8}, 2\frac{3}{4}$. 80. $2\frac{1}{2}, 4\frac{1}{2}, 7\frac{1}{8}$.
75. $1\frac{1}{2}, 1\frac{1}{4}, \frac{3}{8}$. 78. $1\frac{1}{8}, 1\frac{1}{2}, 1\frac{3}{4}$. 81. $\frac{1}{2}, \frac{3}{8}, \frac{1}{4}, 1\frac{1}{4}$.
82. $\frac{7}{8}, 1\frac{5}{8}, \frac{7}{8}, 1\frac{1}{8}$. 83. $2\frac{3}{8}, 8\frac{1}{2}, 9\frac{3}{8}, 1\frac{1}{8}$.
84. $\frac{3}{8}, 1\frac{7}{8}, 4\frac{1}{8}, 4\frac{1}{4}$.
85. $\frac{3}{4}, \frac{3}{8}$ of $2\frac{5}{8}$, $\frac{5}{8}$ of $1\frac{3}{4}$.
86. $\frac{3\frac{1}{2}}{40}, \frac{8}{9}$ of $1\frac{5}{8}$, $4\frac{1}{2} \times 2\frac{3}{8}$, $1\frac{1}{4}$ of 2.
87. $\frac{5}{8}$ of $\frac{7}{8}$, $\frac{8}{9}$ of $4\frac{1}{2}$, $\frac{2}{3}$ of $8\frac{5}{8}$.
88. $\frac{1}{2}, \frac{3}{8}, \frac{1}{4}, \frac{3}{8}, \frac{5}{8}, \frac{7}{8}, \frac{5}{8}, \frac{1}{4}$.
89. $9\frac{1}{8}, 11\frac{1}{4}, 6\frac{1}{2}, 5\frac{1}{2}, 7\frac{3}{8}$.
90. $\frac{1}{80}, 1\frac{5}{80}, 1\frac{1}{4}, \frac{7}{80}, 2\frac{3}{8}$.

91. $\frac{3}{8}$ and $\frac{5}{8}$. 95. $5\frac{1}{2}$ and $5\frac{3}{4}$. 100. $\frac{3}{8}$, $\frac{5}{8}$, and $1\frac{1}{8}$.
 92. $2\frac{1}{2}$ and $9\frac{1}{2}$. 96. $1\frac{3}{8}$ and $2\frac{3}{8}$. 101. $8\frac{1}{2}$, $7\frac{1}{2}$, and $1\frac{3}{8}$.
 93. $5\frac{1}{3}$ and $6\frac{7}{8}$. 97. $\frac{7}{10}$ and $\frac{1}{18}$. 102. $\frac{1}{4}$, $\frac{7}{8}$, and $4\frac{5}{8}$.
 94. $\frac{5}{6}$ and $\frac{8}{9}$. 98. $\frac{2}{3}$ and $1\frac{5}{6}$. 103. $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$, $\frac{1}{8}$.
 99. $\frac{7}{8}$ and $1\frac{1}{8}$. 104. $\frac{7}{18}$, $\frac{1}{18}$, and $1\frac{1}{18}$.
 105. $101\frac{1}{2}$, $105\frac{1}{2}$, $426\frac{1}{2}$.
 106. $\frac{3}{8}$ of $\frac{2}{3}$, $\frac{5}{8}$ of $\frac{7}{8}$ of $\frac{7}{10}$, and $\frac{3}{10}$ of $1\frac{7}{8}$.
 107. $5\frac{1}{2}$, $7\frac{1}{3}$, $14\frac{2}{3}$, $97\frac{1}{18}$, and 47.
 108. $1\frac{7}{8}$, $\frac{3}{8}$, $\frac{3}{8}$, $1\frac{1}{2}$, $\frac{3}{8}$, $1\frac{1}{2}$, and $1\frac{1}{2}$.

I09. $\frac{3}{4}$ from $\frac{7}{8}$. **I12.** $\frac{4}{7}$ from $\frac{8}{11}$. **I15.** $8\frac{3}{4}$ from $6\frac{1}{2}$.
I10. $\frac{1}{2}$ from $\frac{3}{4}$. **I13.** 2 from $5\frac{1}{2}$. **I16.** $\frac{10}{11}$ from $\frac{1}{11}$.
I11. $\frac{4}{5}$ from $\frac{5}{8}$. **I14.** $1\frac{1}{3}$ from $6\frac{2}{3}$. **I17.** $7\frac{5}{8}$ from $12\frac{1}{2}$.
I18. $40\frac{1}{2}$ from $60\frac{5}{8}$. **I19.** $812\frac{7}{11}$ from $424\frac{3}{11}$.
I20. $796\frac{1}{2}$ from $8780\frac{1}{11}$.

I21. $46\frac{4}{5}$ and $15\frac{1}{2}$. **I25.** $\frac{3}{4}$ of $\frac{5}{8}$ and $\frac{3}{8}$ of 4.
I22. $16\frac{3}{5}$ and $10\frac{1}{3}$. **I26.** $7\frac{1}{8}$ of $\frac{3}{7}$ and $\frac{5}{7}$ of 17.
I23. $29\frac{1}{11}$ and $97\frac{1}{11}$. **I27.** $(\frac{5}{4} + \frac{1}{8})$ and $(\frac{1}{8} - \frac{1}{16})$.
I24. $\frac{17}{88}$ and $\frac{9}{48}$. **I28.** $\frac{1}{16}$ and $(\frac{1}{3} + \frac{7}{8}) \times \frac{1}{16}$.

Find the value of—

- | | |
|--|---|
| 129. $\frac{3}{8} - \frac{5}{8}$. | 134. $(18\frac{1}{3} + 9\frac{1}{2}) - (4\frac{2}{3} + 7\frac{1}{6})$. |
| 130. $8\frac{3}{4} - 5\frac{1}{4}$. | 135. $\frac{1}{6} - \frac{1}{12}$ of $\frac{3}{4}$ of $\frac{4}{5}$. |
| 131. $\frac{1}{11} - \frac{5}{13} + \frac{6}{14}$. | 136. $\frac{3}{8}$ of $\frac{1}{6} + \frac{3}{4}$ of $\frac{1}{11}$. |
| 132. $\frac{3}{4} + \frac{5}{7}$ of $1\frac{1}{8}$. | 137. $(1\frac{1}{4} + \frac{7}{8}) + (1\frac{1}{4} - \frac{7}{8})$. |
| 133. $\frac{1}{8} + 8\frac{1}{4} - \frac{1}{8}$. | 138. $(\frac{3}{11} + \frac{1}{12}) - (\frac{1}{12} - \frac{3}{11})$. |

Addition and Subtraction.—Applications.

139. Henry received the following sums at different times: \$6 $\frac{3}{8}$, \$4 $\frac{1}{4}$, \$12 $\frac{9}{10}$, and \$7 $\frac{1}{4}$; how much did he receive in all?

140. A miller ground 98 $\frac{1}{4}$ bushels of corn one day, 87 $\frac{9}{8}$ the next, 75 $\frac{1}{4}$ the next, and 89 $\frac{1}{8}$ the next; how many bushels did he grind?

141. What number is that from which if 88 $\frac{1}{4}$ is taken 56 $\frac{1}{8}$ will remain?

142. A merchant had three pieces of cashmere each containing 46 $\frac{1}{8}$ yards; from one he sold 17 $\frac{3}{4}$ yards, from another 24 $\frac{3}{8}$ yards, and from the other 29 $\frac{5}{8}$ yards; how many yards were left in all?

143. A merchant sold a customer 22 $\frac{1}{2}$ yards silk, 4 $\frac{1}{4}$ yards paper-muslin, 2 $\frac{1}{8}$ yards silesia, 5 $\frac{3}{4}$ yards cambric, and 7 $\frac{1}{8}$ yards braid; how many yards were sold?

144. A web of cloth contained 38 $\frac{7}{8}$ yards, from which a tailor cut as follows: 4 $\frac{2}{3}$ yards, 2 $\frac{1}{2}$ yards, 6 $\frac{1}{4}$ yards, 5 $\frac{1}{8}$ yards, 9 $\frac{1}{4}$ yards; how many yards were left?

145. What number plus the difference between 49 $\frac{1}{11}$ and 62 $\frac{3}{4}$ will give 98 $\frac{1}{4}$?

146. A man has four fields whose sizes are as follows: 89 $\frac{1}{2}$ acres, 40 $\frac{1}{2}$ acres, 25 $\frac{6}{7}$ acres, and 30 $\frac{3}{4}$ acres; how much is lacking of a half section?

147. The weights of four loads of straw including the wagon, which weighs 18 $\frac{7}{8}$ cwt., are 42 $\frac{4}{5}$ cwt., 39 $\frac{3}{10}$ cwt., 45 $\frac{11}{10}$ cwt., 43 $\frac{1}{5}$ cwt.; what is the weight of the straw?

148. A person engages $4\frac{1}{2}$ tons of sugar but when delivered he finds the first ton falls short $32\frac{3}{4}$ pounds, the second $89\frac{1}{8}$ pounds, the third $89\frac{1}{8}$ pounds, and the fourth overweighs $52\frac{1}{2}$ pounds; how much sugar should he pay for?

149. What is the sum of the sum and difference of $\$28\frac{1}{2}$ and $\$90\frac{3}{4}$?

150. The sum of two fractions is $\frac{3}{8}$, and the difference $\frac{1}{4}$; what are the fractions?

Multiplication of Fractions.

Multiply—

- | | | |
|---------------------------------------|--------------------------------------|---|
| 151. $\frac{1}{2}$ by $\frac{3}{8}$. | 156. $9\frac{1}{2}$ by 6. | 161. 120 by $5\frac{1}{2}$. |
| 152. $\frac{3}{4}$ by $\frac{1}{2}$. | 157. $7\frac{3}{8}$ by 7. | 162. $12\frac{1}{2}$ by $8\frac{1}{2}$. |
| 153. $\frac{5}{8}$ by $\frac{1}{4}$. | 158. 6 by $6\frac{3}{4}$. | 163. $27\frac{1}{2}$ by 18. |
| 154. $\frac{3}{4}$ by $\frac{1}{2}$. | 159. 27 by $\frac{1}{4}$. | 164. 96 by $\frac{3}{4}\frac{3}{8}$. |
| 155. $7\frac{1}{2}$ by 9. | 160. $\frac{1}{2}\frac{3}{4}$ by 48. | 165. $95\frac{1}{2}$ by $17\frac{1}{2}$. |

166. $16\frac{3}{8}$ by $12\frac{1}{2}$.

167. $\frac{1}{144}$ of $18\frac{3}{4} \times \frac{3}{8} \times 4\frac{2}{11}$ by $8\frac{3}{4}$ of $\frac{1}{2}\frac{5}{8} \times \frac{1}{144}$.

Illus.— $6\frac{1}{2} \times 6\frac{1}{2} = 6 \times (6+1) + \frac{1}{4} = 42\frac{1}{4}$.

168. $2\frac{1}{2} \times 2\frac{1}{2} = ?$ 170. $8\frac{1}{2} \times 8\frac{1}{2} = ?$ 172. $9\frac{1}{2} \times 9\frac{1}{2} = ?$

169. $4\frac{1}{2} \times 4\frac{1}{2} = ?$ 171. $12\frac{1}{2} \times 12\frac{1}{2} = ?$ 173. $7\frac{1}{2} \times 7\frac{1}{2} = ?$

Find the cost of—

174. $9\frac{1}{2}$ lb. beef at $9\frac{1}{2}$ ct. a lb.
 175. $12\frac{1}{2}$ lb. butter at $12\frac{1}{2}$ ct. a lb.
 176. $19\frac{1}{2}$ bu. oats at $19\frac{1}{2}$ cts. a bu.
 177. $8\frac{3}{8}$ qt. nuts at $8\frac{3}{4}$ ct. a qt.
 178. $16\frac{1}{2}$ lb. sugar at $7\frac{1}{2}$ ct. a lb.
 179. $896\frac{1}{2}$ lb. cotton at $14\frac{3}{4}$ ct. a lb.
 180. $18\frac{3}{8}$ bbl. rice at $\$19\frac{3}{8}$ a bbl.
 181. $18\frac{3}{4}$ yd. ribbon at $81\frac{1}{4}$ cts. a yd.
 182. $86\frac{5}{8}$ lb. raisins at $16\frac{3}{8}$ cts. a lb.
 183. $\frac{3}{4}$ of $\frac{3}{8}$ of a bbl. of pork at $\$18\frac{3}{4}$ a bbl.
 184. $18\frac{3}{8}$ lb. bacon at $12\frac{1}{2}$ cts. a lb.

185. $9\frac{1}{2}$ yd. velvet at $\$4\frac{1}{2}$ a yd.
 186. $48\frac{1}{2}$ lb. honey at $18\frac{1}{2}$ ct. a lb.

Division of Fractions.

Divide—

- | | |
|--|--|
| 187. $\frac{1}{2}$ by 6. | 197. $78\frac{1}{2}$ by $9\frac{1}{2}$. |
| 188. $\frac{3}{4}$ by 8. | 198. $27\frac{1}{2}$ by $8\frac{1}{2}$. |
| 189. $\frac{4}{7}$ by 19. | 199. 845 by $\frac{1}{16}$. |
| 190. $\frac{1}{2}$ by $\frac{3}{4}$. | 200. 159 by $5\frac{1}{2}$. |
| 191. $14\frac{1}{2}$ by $1\frac{1}{2}$. | 201. 806 by $8\frac{1}{2}$. |
| 192. $86\frac{2}{3}$ by 28. | 202. $9\frac{1}{2}$ by 267. |
| 193. 256 by $8\frac{7}{8}$. | 203. $1\frac{5}{8}$ by $\frac{2}{3}$. |
| 194. 729 by $22\frac{1}{2}$. | 204. $200\frac{1}{2}$ by $100\frac{1}{2}$. |
| 195. $1\frac{1}{2}$ by $\frac{1}{2}$. | 205. $\frac{3}{4}$ of $25\frac{1}{2}$ by $1\frac{1}{2}$. |
| 196. $8\frac{1}{2}$ by $12\frac{1}{2}$. | 206. $\frac{2}{3}$ of $85\frac{1}{2}$ by $\frac{1}{2}$ of $8\frac{1}{2}$. |

Complex Fractions.

Simplify—

- | | | |
|---|--|--|
| 207. $\frac{\frac{1}{2}}{4\frac{1}{2}}$. | 211. $\frac{84}{\frac{1}{12}}$. | 215. $\frac{4\frac{1}{2} + 6\frac{1}{2}}{7\frac{1}{2} + 4\frac{1}{2}}$. |
| 208. $\frac{8\frac{1}{2}}{9\frac{1}{2}}$. | 212. $\frac{2\frac{1}{2}}{\frac{1}{8}}$. | 216. $\frac{\frac{7}{8} \text{ of } \frac{1}{2}}{10\frac{1}{2}}$. |
| 209. $\frac{56\frac{1}{2}}{99}$. | 213. $\frac{\frac{1}{2} + \frac{1}{2}}{\frac{1}{4} + \frac{1}{4}}$. | 217. $\frac{12\frac{1}{2} \div 8\frac{1}{2}}{41\frac{1}{2} \div 3\frac{1}{2}}$. |
| 210. $\frac{\frac{1}{2}}{9\frac{1}{11}}$. | 214. $\frac{\frac{1}{2} - \frac{1}{2}}{\frac{1}{2} + \frac{1}{2}}$. | 218. $\frac{1}{2} \times \frac{2}{21}$. |
| 219. $48 \times \frac{5}{4\frac{1}{2}} \times \frac{6\frac{1}{2}}{9\frac{1}{2}} \times \frac{8\frac{1}{2}}{2070}$. | | |
| 220. $(\frac{2}{3} \times 1\frac{1}{2} + \frac{1}{2} \text{ of } 1\frac{1}{2}) \times \frac{7\frac{1}{2}}{3\frac{1}{2}} \div (2\frac{1}{2} - 4\frac{1}{2})$. | | |
| 221. $\frac{2}{1 - \frac{1}{2}} \times \frac{8}{2 - \frac{1}{2}} \times \frac{4}{8 - \frac{1}{2}} \div \frac{5}{4 - \frac{1}{2}}$. | | |
| 222. $\frac{\frac{3}{4} - \frac{2}{3}}{\frac{1}{8} - \frac{1}{4}} \times \frac{\frac{9}{10} - \frac{1}{2}}{\frac{1}{4} - \frac{1}{2}} + \frac{1\frac{1}{2} \times \frac{3}{4}}{\frac{1}{2} \times \frac{1}{4}} - \frac{1\frac{1}{2}}{\frac{2}{3}} \div \frac{5}{8}$. | | |
| 223. $(\frac{8\frac{1}{2} + 1\frac{1}{2} - 1\frac{1}{2}}{\frac{1}{4} \text{ of } 8\frac{1}{2}}) \times (\frac{1}{2} \div 1\frac{1}{2} \times \frac{2\frac{1}{2} + 1\frac{1}{2}}{4\frac{1}{2} - 8\frac{1}{2}}) = ?$ | | |

Relation of Numbers.

What is the relation of 6 to 21, or 21 is how many times 6? (Ans. 21 is $3\frac{1}{2}$ times 6.)

What is the relation of—

- | | | |
|---------------------|----------------------------|---|
| 224. 25 to 75? | 231. 288 to 729? | 238. 96 to $\frac{1}{4}$? |
| 225. 72 to 24? | 232. 420 to 588? | 239. 175 to $8\frac{1}{8}$? |
| 226. 84 to 91? | 233. 540 to 482? | 240. $\frac{2}{11}$ to 85? |
| 227. 188 to 28? | 234. 75 to 125? | 241. $\frac{5}{8}$ to $\frac{1}{3}$? |
| 228. 64 to 120? | 235. $\frac{2}{3}$ to 9? | 242. $\frac{1}{4}$ to $\frac{4}{5}$? |
| 229. \$.80 to \$.5? | 236. $\frac{6}{11}$ to 24? | 243. $8\frac{1}{2}$ to $4\frac{1}{3}$? |
| 230. 1899 to 2748? | 237. $\frac{2}{3}$ to 64? | 244. $8\frac{1}{4}$ to $6\frac{1}{4}$? |

What part of—

- | | | |
|---|---------------------------------------|--|
| 245. 152 is 48? | 248. $\frac{1}{4}$ is $\frac{5}{6}$? | 251. $\frac{4}{5}$ of $\frac{4}{5}$ is $\frac{2}{5}$? |
| 246. 270 is 216? | 249. 5 is $\frac{4}{5}$? | 252. $\frac{2}{3}$ of $8\frac{1}{2}$ is 5? |
| 247. \$40 is \$5 $\frac{1}{3}$? | 250. 9 is $\frac{1}{3}$? | |
| 253. $\frac{1}{4}$ of \$4 is \$2 $\frac{1}{2}$? | | |
| 254. $\frac{2}{3}$ of 6 is $\frac{2}{3}$ of $\frac{2}{3}$ of what number? | | |
| 255. $\frac{4}{5}$ of 28 is $\frac{4}{11}$ of 5 times what number? | | |
| 256. $\frac{1}{10}$ of 25 is $\frac{2}{3}$ of how many times 12? | | |
| 257. A has 60 sheep, which is $\frac{4}{5}$ of B's number; now if each obtain $\frac{2}{3}$ of the others, what part of B's will equal A's? | | |
| 258. A boy lost $\frac{2}{3}$ of his money, and then earned 85 cents, when he found that he had $\frac{1}{10}$ of what he had at first; how much had he at first? | | |

Miscellaneous Problems.

259. Required the sum of $17\frac{5}{8}$, $9\frac{1}{2}$, $18\frac{2}{3}$ and $17\frac{1}{4}$.
260. Find the difference between $579\frac{2}{3}$ and $294\frac{5}{8}$.
261. Find the value of $(8\frac{7}{8} + 9\frac{3}{4}) - 7\frac{1}{2}$ of $1\frac{1}{2}$.
262. What number diminished by $24\frac{5}{8}$ leaves $18\frac{1}{16}$?
263. Subtract $\frac{1}{10}$ of $7\frac{1}{2}$ from $3\frac{1}{2}$ of 8.
264. What number divided by $\frac{2}{3}$ of $\frac{3}{5} = 1\frac{1}{2}$?
265. What is the product of $(168 - 49\frac{7}{16})$ by $9\frac{3}{4}$?

266. Add the sum of $9\frac{7}{15}$ and $5\frac{3}{4}$ to their difference.
267. What number plus $\frac{5}{8}$ of $27\frac{3}{4}=37\frac{1}{4}$?
268. Find the sum of $5\frac{3}{4}\times 2\frac{1}{4}$ and $7\frac{3}{4}\times 2\frac{1}{4}$.
269. What number taken from $6\frac{9}{16}$ of $\frac{1}{11}$ leaves $2\frac{3}{4}$?
270. Difference $4\frac{2}{3}$; sum $84\frac{7}{8}$; what are the numbers?
271. What number multiplied by $\frac{5}{11}$ of $\frac{1}{3}$ will give 2?
272. How many poor families can be supplied with $\frac{3}{8}$ of a ton of coal each, from $8\frac{5}{8}$ tons?
273. What cost 4 dozen oranges at $2\frac{3}{4}$ ct. each?
274. If one yard of jeans cost 28 ct., how many yd. can be bought for 95 cents?
275. What cost $27\frac{3}{4}$ acres of land at $\$65\frac{3}{4}$ an acre?
276. Paid $\$165\frac{1}{2}$ for a horse and sold him for $\frac{4}{5}$ as much; what was the loss?
277. How many tons of coal at $\$7\frac{3}{4}$ a ton can be bought for $\$100$?
278. At $\$17\frac{1}{2}$ a bbl., how much sugar will $\$410$ buy?
279. What will 28 tons of hay cost, if $\frac{7}{8}$ of a ton cost $\$10$?
280. If $\$86\frac{1}{3}$ is $\frac{5}{11}$ of the cost of a horse, what will be the cost of 14 horses?
281. Divisor $\frac{3}{5}\frac{2}{15}$; quotient $\frac{7}{4}\frac{2}{3}$; what is the dividend?
282. If an acre of land yield $19\frac{1}{3}\frac{2}{3}$ bu. of wheat, how many acres will yield $897\frac{1}{2}\frac{1}{6}$ bu.?
283. If $\frac{4}{5}$ of a bbl. of sugar cost $\$12.50$, what will 16 bbl. cost?
284. A dairyman sold 281 gal. of milk, at the rate of $\$1\frac{1}{4}$ for $5\frac{1}{2}$ gal.; required the cost.
285. A man sold $\frac{3}{8}$ of $\frac{1}{9}$ of his gas stock; how many fifths of $\frac{1}{9}$ remained?
286. A grocer bought 125 bu. of potatoes at $\$2\frac{1}{2}$ a bu.; 85 bu. at $\$3\frac{1}{8}$ a bu.; 25 bu. at $\$3\frac{1}{16}$ a bu.; at what price per bu. must he sell to gain $\$80.61\frac{1}{4}$?

287. If a person going $4\frac{1}{4}$ mi. an hr., perform a journey in $12\frac{3}{4}$ hr., how much longer would it take him if he traveled $8\frac{1}{4}$ mi. an hr.?

288. If I pay 11 ct. a lb. for live turkeys, which lose $\frac{4}{13}$ of their weight in dressing, at what price per lb. must they be sold to incur no loss?

289. The captain of a vessel owns $\frac{1}{4}$ of it and sells $\frac{1}{8}$ of his share for \$48500; what part of the vessel has he left and what is it worth?

290. How many yd. gingham at $8\frac{1}{4}$ ct. a yd. can be bought for \$4?

291. If $9\frac{1}{2}$ acres of meadow produce 17 ton of hay, how many tons do $6\frac{1}{8}$ acres produce?

292. At the rate of $4\frac{3}{8}$ mi. an hr. how long will it take to perform a journey of $187\frac{7}{8}$ mi.?

293. If $15\frac{1}{5}$ yd. of cloth cost \$47 $\frac{1}{2}$, how much was that a yd.?

294. If $\frac{1}{4}$ of a mill is worth \$8795, what is $\frac{3}{8}$ of the remainder worth?

295. A lady spent $\frac{3}{8}$ of her money for a dress, and $\frac{1}{8}$ of the remainder for a cloak which cost \$18 $\frac{1}{2}$; how much had she at first?

296. If $87\frac{1}{2}$ doz. eggs cost \$9 $\frac{9}{16}$, what cost $27\frac{1}{2}$ doz.?

297. 72 is $\frac{1}{3}$ of a number; what is $\frac{5}{13}$ of it?

298. From $\frac{1}{2}$ section of land, $289\frac{7}{8}$ acres were sold; what is the remainder worth at \$78 $\frac{1}{2}$ an acre?

299. Find the sum, difference, and product of $8\frac{1}{11}$ and $9\frac{3}{4}$, then add these results.

300. A customer buys $18\frac{1}{2}$ yd. prints at $11\frac{1}{2}$ ct. per yd., 14 yd. flannel at $87\frac{1}{2}$ ct. per yd., 8 yd. silk at \$1 $\frac{3}{4}$ per yd., and $1\frac{1}{2}$ yd. lace at 24 ct. a yd.; how much change should she receive from a \$20 bill?

301. $\left(\frac{2-\frac{1}{5}}{8}\right) \times \frac{8-\frac{1}{5}}{4} = \frac{1}{4}$ of $\frac{1}{4}$ of what number?

302. The quotient is $\frac{1}{2}$, and the divisor $\frac{9}{20}$; what is the dividend?

303. The product of three numbers is $174\frac{3}{8}$; one of them is $\frac{3}{8}$, another $40\frac{1}{2}$; what is the third?

304. The product of the sum and difference of two numbers is $121\frac{1}{2}$, the difference is $4\frac{1}{2}$; what are the numbers?

305. John has $\frac{3}{4}$ of \$425; Henry has $\frac{1}{4}$ as much; and William has $\frac{1}{4}$ as much as both; how much have all?

306. If $\frac{1}{4}$ of a mill is worth \$2500, what is $\frac{3}{4}$ of it worth?

307. A man sold two houses for \$1200 each; on one he gained $\frac{1}{4}$ of the cost price, and on the other he lost $\frac{1}{4}$ of the cost; how much did he gain or lose on the two houses?

308. If $\frac{1}{4}$ of an acre of land cost \$120, what are $22\frac{1}{2}$ acres worth?

309. A man owning $\frac{3}{4}$ of a foundry sold $\frac{1}{4}$ of his share for \$26820; what was the value of the foundry?

310. A mechanic earns \$8 $\frac{1}{4}$ a day, and his daily expenses are \$1 $\frac{1}{4}$; how many days' labor will enable him to pay for a suit of clothes costing \$46 $\frac{1}{4}$?

311. If $\frac{1}{4}$ of 8 $\frac{1}{2}$ gal. of oil cost $\frac{1}{15}$ of \$9 $\frac{1}{2}$, how much is that a gallon?

312. What cost 800 bu. of grain at the rate of 8 $\frac{1}{2}$ bu. for \$8 $\frac{1}{2}$?

313. A house costing \$6000 insured for $\frac{3}{4}$ of its value burned and the company pays $\frac{1}{4}$ of the insurance; how much does the owner lose, not including premium?

314. A boy worked 77 $\frac{1}{4}$ days, and after paying his expenses with $\frac{1}{4}$ of his earnings, he had \$37.08; what were his daily wages?

315. I spent $\frac{1}{2}$ of my money and \$6 more, then $\frac{1}{3}$ of the remainder and \$5 more, then $\frac{1}{4}$ of what was left and \$15 more; I then had \$10; how much had I at first?

316. A farmer sold 24 doz. eggs at $22\frac{1}{2}$ ct. a doz., and 12 lb. butter at $27\frac{1}{2}$ ct. a lb.; he was paid in tea at 87 ct. a lb.; how many lb. should he receive?

317. A gentleman gave away $\frac{1}{3}$ of the books of his library, lent $\frac{1}{4}$ of the remainder, and sold $\frac{1}{5}$ of what were left. He then found he had 400 remaining. How many had he at first?

318. A can do a piece of work in 6 days and B can do it in 7 days; in what time can both together do it?

319. C can husk a field of corn in $4\frac{1}{2}$ days and D in $5\frac{1}{2}$ days; in what time can both together do it?

320. E can chop $2\frac{1}{2}$ cords of wood while F chops $3\frac{1}{2}$ cords; how much will F chop while E chops 6 cords?

321. A and B plow $10\frac{1}{2}$ acres in $1\frac{1}{2}$ days. If A can plow 4 acres in a day, how much can B plow?

322. H, J, and W do a piece of work in 5 days; J and W can do it in $6\frac{1}{2}$ days; in what time can H do $\frac{2}{3}$ of it?

323. A, B, and C receive \$24.65 for $4\frac{1}{2}$ days work. Half of A's wages equals $\frac{2}{3}$ of B's and $\frac{1}{3}$ of C's. What are the daily wages of each?

324. How many lemons costing \$8.20 a box, each box containing 240 lemons, must be sold at 2 for 5 ct. to gain \$5.60?

325. How far will a train travel from 6:15 a. m. till 4:12 p. m., the same day, at the rate of 60 mi. in 1 hr. 12 min.?

326. A father divided a piece of land among his children thus: to the eldest he gave $\frac{3}{8}$ of the whole, to the daughter $61\frac{1}{4}$ acres, and to the third as much as to the other two; how many acres did the third get?

327. John and Henry each sells the other $\frac{1}{4}$ of his marbles when $\frac{5}{11}$ of John's equals $\frac{2}{3}$ of Henry's, and both have 60 marbles; how many had each at first?

DECIMAL FRACTIONS.

22. Exercises and Problems in Decimals.

Write and read—

.8	.1204	2.00 $\frac{1}{2}$
.08	.8007	9.1007 $\frac{1}{2}$.
.019	72.809	.0208067
.0098	16.000084	4808.50505
.805	.078846	895.20060548
.0006	4000.004	.009700
.9009	.24 $\frac{1}{2}$	740.008400

Express decimally—

1. $\frac{9}{10}$	7. $\frac{406}{100000}$	13. $\frac{8464}{10000}$
2. $\frac{43}{100}$	8. $24\frac{378}{1000}$	14. $\frac{5642734}{1000}$
3. $\frac{734}{100}$	9. $4\frac{1}{100}$	15. $945\frac{836}{10000000}$
4. $\frac{54845}{1000}$	10. $\frac{861}{100}$	16. $\frac{604\frac{1}{2}}{10000000}$
5. $\frac{10300}{10000}$	11. $\frac{423}{1000}$	17. $400\frac{400}{1000000}$
6. $\frac{5441}{10}$	12. $\frac{53}{100000}$	18. $575\frac{676}{10000}$

19. Write in figures and add—

Fourteen and twenty-seven hundredths.

Seven hundred sixteen and eight tenths.

Four hundred seventy-four thousandths.

Eight thousand nine hundred six hundredths.

Two hundred forty-one hundred-thousandths.

Ninety-five and ninety-five millionths.

One hundred thirty-two hundred-thousandths.

Four hundred seventy-four hundred-thousandths.

Three hundred twenty-three thousandths.

Sixty-four thousand four hundred thirty-five millionths.

Three-eighth tenths.

Six and one-fourth hundredths.

Reduce to common fractions in lowest terms—

20. .125	27. .0125	34. .09875
21. .75	28. .625	35. 12.725
22. .8125	29. .4875	36. 16.075
23. .508	30. .1875	37. 27.48 $\frac{1}{2}$
24. .78125	31. .475	38. 6.10 $\frac{1}{2}$
25. 6.875	32. .00275	39. 7.060 $\frac{1}{2}$
26. 4.008	33. .096	40. 85.98 $\frac{1}{2}$

Reduce to decimals—

41. $\frac{3}{4}$	47. .27 $\frac{1}{80}$	53. $\frac{79}{128}$
42. $\frac{1}{8}$	48. $\frac{9}{25}$	54. $\frac{9}{1280}$
43. $\frac{1}{2}$	49. $\frac{29}{80}$	55. $\frac{24}{800}$
44. $\frac{3}{8}$	50. $\frac{3}{80}$	56. $\frac{199}{400}$
45. 9 $\frac{1}{2}$	51. $\frac{1}{4}$	57. 8 $\frac{1}{8}$
46. $\frac{1}{2}$	52. $\frac{1}{32}$	58. 5 $\frac{1}{2}$

59. Add 9 tenths, 84 hundredths, 64 thousandths, 287 hundred-thousandths, 79828 hundred-thousandths, 68024 millionths, 784 hundredths, 80804 millionths, 98 ten-millionths, 15122 ten-millionths.

60. What is the sum of \$87 $\frac{1}{2}$, \$50.06 $\frac{1}{4}$, \$25 $\frac{1}{4}$, \$28 $\frac{3}{8}$, \$28.87 $\frac{1}{2}$, \$57 $\frac{5}{8}$, \$15.87 $\frac{1}{4}$?

61. From 8 take 3 ten-millionths.

62. From the sum of 84.0648 and 9.0076 $\frac{1}{2}$ take 48.08 $\frac{1}{16}$.

63. 684— .0848+29.086 $\frac{1}{2}$ —349.09 $\frac{3}{32}$ —.089047=?

64. Find the difference between 307 $\frac{1}{4}$ and 4087 $\frac{1}{2}$.

65. From the sum of 22.52 $\frac{1}{8}$ and 8.000 $\frac{1}{4}$ take 10.059 $\frac{1}{4}$.

66. 12 $\frac{1}{2}$ —2.02+ $\frac{3}{4}$ —.001+2.1—.08+ $\frac{2}{5}$ —.00 $\frac{1}{2}$ =?

Multiply—

67. .542 by 5.8.	72. 9 $\frac{1}{2}$ ×.08 $\frac{1}{4}$ by 100.
68. .0869 by 8.24.	73. .5 of $\frac{1}{11}$ by .05 $\frac{1}{4}$.
69. .00364 by .08.	74. .07 of 9 $\frac{3}{4}$ by $\frac{5}{8}$ of 800.
70. 2.0709 by .00026.	75. 18.88 $\frac{1}{2}$ by 42.075.
71. 12 $\frac{5}{16}$ by 1000.	76. 4.49 $\frac{1}{8}$ by 68.11 $\frac{1}{4}$.

77. 408 millionths by 825 tenths.
 78. 845 ten-millionths by 7500.
 79. 290 hundred-thousandths by 1000 millionths.
 80. 85 ten-thousandths by 64 thousandths.
 81. $\$75.87\frac{1}{2}$ by $\frac{1}{3}$ of 986 hundredths.
 82. What cost $140\frac{1}{2}$ acres of land at $\$94.5$ an acre?
 83. What will $850\frac{1}{2}$ bu. of wheat cost at $64\frac{1}{3}$ ct. a bu.?
 84. What cost 12.96 yd. cloth at $\$0.0625$ a yd.?
 85. What is the area of a field .275 miles by 82.5 mi.?

Divide—

- | | |
|----------------------------------|--|
| 86. .072 by 240. | 92. 250. by .000625. |
| 87. 59.994 by 8.888. | 93. $\frac{4\frac{1}{2}}{11\frac{1}{2}}$ by $\frac{1}{16}$. |
| 88. .0060858 by 4.88 | 94. .144 by .02 $\frac{1}{2}$. |
| 89. .225 by 1875. | 95. .0054 by 1440. |
| 90. 284.61875 by $16\frac{1}{8}$ | 96. 101.6688 by 2.86. |
| 91. .08684 by 1000. | 97. .000625 by 25. |

General Review.

98. What decimal fraction equals $\frac{3}{8125}$?
 99. What is the decimal value of $\frac{7}{24} \times \frac{9}{10} \times \frac{1}{3} \times \frac{1}{4}$?
 100. $(688.21 + 816.79 - 999.88) \times .017 = ?$
 101. Find the value of $\$15 \times 6.08\frac{1}{4} + \$25.6\frac{1}{3} \times .05\frac{1}{3}$.
 102. $(\$695.68 \div \$10.87) \times .0025 + .01\frac{1}{4} \times 50 = ?$
 103. Multiply the sum of 1.5 and $\frac{10\frac{1}{2}}{42}$ by the difference between $\frac{25\frac{1}{2}}{51}$ and $\frac{20}{58\frac{1}{2}}$.
 104. Multiply $\frac{62\frac{1}{2}}{1000}$ by 75 millionths, and divide the product by 125 hundred-thousandths.
 105. What number divided by $.024\frac{19\frac{1}{2}}{24\frac{1}{2}} = .242$?
 106. Find the value of $\left(\frac{1.45\frac{1}{2} \times 4.65}{1.25 \div .081\frac{1}{4}} \times \frac{16.74 - 4\frac{1}{2}}{4\frac{1}{2} - 2.97} \right) \div .01\frac{1}{2}$.
 107. $[(1.45\frac{1}{2} \times 4.65 \div 1.25 \div .081\frac{1}{4}) \times (16.74 - 4\frac{1}{2} \div 4.75 - 2.97)] \div .007 = ?$

108. From the sum of $\$87\frac{1}{2}$ and $62\frac{1}{2}$ ct. take the sum of $\$12\frac{1}{2}$, $\$18\frac{1}{2}$, $18\frac{1}{2}$ dimes and $18\frac{1}{2}$ mills.

109. Subtract the sum of $\$809\frac{1}{2}$ and $81\frac{1}{2}$ dimes from the difference between $\$.06\frac{1}{2}$ of $\$25\frac{1}{2}$ and $\$344\frac{1}{2}$.

110. What cost 8.875 tons of hay at $\$12\frac{1}{2}$ a ton?

111. How many bbl. of flour at $\$4.65$ a bbl. must be given for 85.25 bu. of wheat at $\$.65$ a bu., 67.75 bu. of corn at 88.5 ct. a bu. and 40.5 bu. of oats at $\$.29$ a bu.?

112. Two men divide 2691.75 bu. of wheat between them, one taking $.62\frac{1}{2}$, the other $.87\frac{1}{2}$; how many bu. belong to each?

113. What will it cost to dig 89.81 rod of ditch, if 79.62 rods cost $\$176.25$?

114. A perch of masonry contains 24.75 cu. ft.; how many perches in a wall 125.5 ft. by 6.5 ft. by 1.25 ft.?

115. What cost 86 pieces of calico, each containing $42\frac{1}{2}$ yd., at $6\frac{1}{4}$ ct. a yd.?

116. Mr. Smith gave .19 of his income to charity, spent .09 for books, $.12\frac{1}{2}$ in travel, .26 for household expenses, invested .18, and deposited $\$2145.82$ in bank; what was his income?

117. At the rate of $5\frac{1}{2}$ bbl. of flour for $\$39\frac{1}{2}$, what will 19 bbl. cost?

118. The circumference of the fore wheel of a wagon is 11.25 ft. and of the hind wheel 12.75 ft.; how much oftener does one turn than the other in going a mile?

119. In a district containing 890144 inhabitants, it was found that $.18\frac{1}{4}$ of the number could not read and $.08\frac{1}{4}$ of those who could read could not write; how many could both read and write?

120. A ship whose cargo was valued at $\$80688$ being disabled by storm, $.81\frac{1}{4}$ of the cargo was thrown overboard; how much would a person lose who owned $.48\frac{1}{4}$ of the cargo?

121. If $5\frac{1}{8}$ yd. cloth cost $\$4\frac{5}{16}$, what will $17\frac{5}{8}$ yd. cost?
122. A, B, and C have $\$3240$. $\frac{1}{3}$ of A's money is equal to $.5$ of B's, and $.75$ of B's is equal to $.85\frac{5}{7}$ of C's; how much has each?
123. H and J buy property worth $\$2250$, J paying $.8$ as much as H; if the property rise in value $.66\frac{2}{3}$, what should H receive for his share?
124. Divide $\$16825$ among C, D, and E, giving E $\$94\frac{1}{4}$ more than D, and D $\$165.75$ more than C.
125. A, C, and W form a company; A puts in $\$1858.5$, C $\$4911\frac{3}{4}$, and W $\$6504\frac{3}{4}$; how many hundredths of the stock does each own?

Commercial Transactions.

What cost—

126. 6280 ft. of lumber at $\$12.50$ a M?
127. 986 ft. of boards at $\$2.87\frac{1}{2}$ a C?
128. 8684 lb. of pork at $\$9.24$ a cwt.?
129. $887\frac{1}{2}$ lb. beef at $\$6.48$ a cwt.?
130. 428 lb. bran at $\$.75$ a cwt.?
131. 1496 ft. clear stuff at $\$4.25$ a C?
132. 12675 bricks at $\$8$ a M?
133. 5378 lb. freight at $\$2.25$ a C?
134. 17250 shingles at $\$6$ a M?
135. 7877 ft. scantling at $\$8.97\frac{1}{2}$ a M?
136. 7875 lb. hay at $\$18\frac{1}{2}$ a ton?
137. 24089 lb. straw at $\$7\frac{1}{2}$ a ton?
138. 8145 E. H. oysters at $87\frac{1}{2}$ ct. a C?
139. 9850 ft. lath at $\$8.06\frac{1}{4}$ a M?
140. 7225 lb. Lehigh coal at $\$6.75$ a ton?
141. 87487 lb. freight at $\$2.40$ a ton?
142. 25345 lb. flour at $\$4\frac{1}{4}$ a cwt.?
143. 8040 ft. flooring at $\$22\frac{1}{2}$ a M?
144. 2580 lath at 80 ct. a C?

SANTA CLARA COUNTY
 TEACHERS' LIBRARY
 No.

145. 6165 fence pickets at $\$5\frac{1}{2}$ a M?
146. 44642 ft. timber at $\$11\frac{3}{8}$ a M?
147. 4680 lb. fertilizer at $\$17.50$ a ton?
148. 712 lb. beef at $\$12.50$ a cwt.?
149. What is gained on 12240 buttons, bought at $\$9$ a great gross and retailed at 10 ct. a doz.?
150. At $\$1\frac{1}{2}$ per M ft., the gas bill of W. & Co. for a mo. was $\$48.88$; how many ft. were used?
151. How many rails may be bought for $\$79.05$, at $\$8.75$ per M?
152. A farmer received $\$99.56$ for 29500 lb. of straw; at what price per ton did he sell?
153. What is the gain per M on envelopes sold at 10 ct. a package of 25 each bought at $\$2.87\frac{1}{2}$ per M?
154. What is the gain on a car load of lime of 82460 lb., counting .05 for waste, costing $\$8.80$ a ton and retailed at 80 ct. a cwt.?
155. At $\$1.60$ a ton how many lb. of coal can be bought for $\$200$?
156. How much is made on a stack of hay of 28482 lb. bought at $\$12\frac{1}{2}$ a ton, bailed at a cost of $\$2\frac{1}{2}$ a ton, and sold at $\$.85$ a bale of 80 lb. each?
157. A dealer sold a farmer coal as follows: 4465 lb., 8996 lb., 4788 lb., at $\$1.75$ a ton, and took in exchange corn at 40 ct. a bu.; how many bu. of corn were required?
158. How must lumber bought at $\$28\frac{1}{2}$ per M, be sold by the C to gain .08 of the cost?
Arrange properly the following bills of goods, and find the amount of each:
159. April 12, 1894, John Finn, Decatur, Ill., sold J. W. Bowers 16 $\frac{1}{2}$ lb. ham, at $12\frac{1}{2}$ ct; 12 lb. bacon, at 10 ct.; 8 sacks flour, at 68 ct.; 8 lb. rice, at 6 ct.; 10 lb. hominy, at $2\frac{1}{2}$ ct.; 5 lb. prunes, at $6\frac{1}{2}$ ct.; 2 gal. sirup, at $87\frac{1}{2}$ ct.; 1 $\frac{1}{2}$ lb. tea, at 45 ct.

160. May 8, 1894, O. M. Anstead bought of W. A. Sandford, Phila., Pa., 420 yd. sheeting, at $8\frac{1}{4}$ ct.; 240 yd. cambric, at $8\frac{1}{4}$ ct.; 186 yd. red table linen, at 19 ct.; 8 pcs., 88 yd. each, Henriettas, at $87\frac{1}{2}$ ct.; 160 yd. China silk, at 85 ct.; 60 doz. black hose, at $62\frac{1}{2}$ ct. per doz. 1000 yd. garter web, at $\$1\frac{1}{8}$ ct.; 100 doz. spool silk, at 45 ct. per doz.

161. C. J. Bryan, Chicago, Ill., June 8, 1894
To Locke, Huleatt & Co., Dr.

4 $\frac{1}{2}$	Doz. Shirts & Drawers -	\$ 8 00	\$ 36
1 $\frac{1}{8}$	" Over Shirts - - -	7 50	
2	" " " - - -	2 60	
5	" Half Hose - - -	90	
5	" " " - - -	1 90	
1	" Silk Handk'f - -	6 00	
6	" T. R. " - -	55	
10	" Suspenders - - -	1 87 $\frac{1}{2}$	
8	" Gents' Shirts - -	8 25	

162. Chicago, Ill., Mar. 1, 1895.
Geo. W. Jones & Co.
To Becker, Mayer & Co., Dr.

LOT					
1900	10	Suits (2 Coats and Vests to follow), @	\$ 7 50		
1910	8	" - - - - - @	8 00		
2001	9	" (2 Pants to follow), - @	8 50		
800	8	" (1 " " "), - @	4 50		
101	10	" (2 Coats and Vests to follow), @	9 00		
1202	12	" (2 " " " " @	18 50		
1112	10	" - - - - - @	18 00		
1418	7	" To close lot, - - - @	8 50		
2421	12	" (1 Coat and Vest to follow), @	18 50		

Find the amt. of the above bill already rec'd. Coats being worth $\frac{2}{3}$ of the suit, and the vest $\frac{1}{3}$ of the coat

COMPOUND DENOMINATE NUMBERS.

23. Models for Reduction by Analysis:

<i>Descending.</i>	<i>Ascending.</i>
SCALE: 4 8 2	2 8 4
2 bu. 8 pk. 5 qt. 1 pt.	187 pt. $\div$ 2 pt. = 98 qt. + 1 pt.
1 bu. = 4 pk.	98 qt. $\div$ 8 qt. = 11 pk. + 5 qt.
2 bu. = 8 pk.	11 pk. $\div$ 4 pk. = 2 bu. + 8 pk.
8 pk. + 8 pk. = 11 pk.	2 bu. 8 pk. 5 qt. 1 pt. Ans.
1 pk. = 8 qt.	
11 pk. = 88 qt.	
88 qt. + 5 qt. = 98 qt.	
1 qt. = 2 pt.	
98 qt. = 186 pt.	
186 pt. + 1 pt. = 187 pt. Ans.	

24. Exercises and Problems in Compound Numbers:

Reduce :	Change :
1. 4 bu. 8 pk. 5 qt. to pt.	12. 74825 li. to mi.
2. 8 T. 5 cwt. 25 lb. to lb.	13. 6.25 sq. mi. to acres.
3. 8146 in. to rd.	14. Feb. 1900 to sec.
4. 20 s. 7 d. 1 far. to far.	15. 2485468 sheets to rm.
5. 4 sq. rd. 2 sq. yd. to sq. in.	16. 24 cd. 8 cd. ft. to cu. ft.
6. 7 bundles to quires.	17. $4\frac{1}{2}$ G. gro. to doz.
7. 54862086 cu. in. to cd.	18. 792 in. to fathoms.
8. 2648 sq. rd. to acres.	19. 8276 gi. to bbl.
9. $82\frac{1}{2}$ gal. to gi.	20. 87680 min. to wk.
10. 642518 gr. to lb.	21. 1962 doz. to G. gro.
11. 18 gro. 7 doz. to units.	22. 14 mi. 18 rd. to yd.

Reduce to integers of lower denominations :

23. $\frac{7}{144}$ of a gal.	25. $\frac{5}{8}$ of a mi.
24. $\frac{1}{80}$ of a bu.	26. $\frac{3}{128}$ of an oz. Troy.

- | | |
|---|------------------------|
| 27. $\frac{1}{2}$ of an acre. | 34. .9875 of an acre. |
| 28. $\frac{1}{4}$ of a yr. | 35. .1609 of a ton. |
| 29. $\frac{1}{2}$ of $\frac{1}{4}$ of a lb. Troy. | 36. .125 of a sq. rd. |
| 30. $\frac{1}{16}$ of a day. | 37. .625 of a hhd. |
| 31. $\frac{1}{4}$ of a cd. | 38. .1875 of a pwt. |
| 32. .8 of a bu. | 39. .785 bbl. of pork. |
| 33. 1.875 of a wk. | 40. .128 of an acre. |

What part of

What decimal part of

- | | |
|---|--|
| 41. \$1 is 68.75 ct.? | 50. 1 wk. is 4 da. 19 hr. 80 min.? |
| 42. 1 acre is 96 sq. yd.? | |
| 43. 1 bu. is 8 pk. 1 qt. 1.2 pt.? | 51. £1 is 18 s. 6 d.? |
| 44. 1 T. is 18 cwt. 75 lb.? | 52. 1 T. is 2 cwt. 59.2 lb.? |
| 45. 8 bu. is 1 bu. 2 pk. 1 pt.? | 53. 8 sq. mi. is 190 acres? |
| 46. 2 mi. is 72 rd. $2\frac{1}{2}$ yd.? | 54. 2 cwt. is $69\frac{1}{4}$ lb.? |
| 47. 1 bbl. is 7 gal. 8 qt. 1 pt.? | 55. 8.75 bu. is 8 pk. 7 qt.? |
| 48. 1 mi. is 1 ch. 48 li.? | 56. 4 lb. Troy is 14 oz. 12 pwt.? |
| 49. 1 lb. avoird. is 1 lb. Troy? | 57. 1 da. is 5 hr. 48 min.? |
| 59. What is the value of 4 lb. 5 oz. gold at \$1.20 a pwt.? | 58. 2 cd. ft. is $4\frac{1}{2}$ cu. ft.? |
| 60. If 12 bu. of wheat weigh 720 lb. 12 oz., how much will 40 bu. weigh? | |
| 61. What cost 8 cd. 100 cu. ft. of wood at \$2 $\frac{1}{4}$ a cd.? | |
| 62. Bought 48 T. 2 cwt. 85 lb. steel at \$80 a T.; what did it cost me? | |
| 63. How many jars each holding 2 gal. 1 qt. 1 pt. can be filled from 8 hhd. of apple-butter? | |
| 64. What cost $2\frac{1}{2}$ bbl. of flour at $8\frac{1}{4}$ ct. a lb.? | |
| 65. How many boards 12 ft. long will make a fence 4 boards high around a field 48 rd. long and 72 rd. wide? | |
| 66. A captain of a vessel, taking the soundings, found the water to be 680 fathoms in depth; what part of a mi. was it? | |
| 67. How often will a clock that ticks seconds tick from noon to midnight? | |

68. Find the value of a pile of wood 80 ft. long, 9 ft. high, 4 ft. wide, at \$1.75 a cord.
69. How many revolutions will a wagon wheel whose circumference is 12 ft. 4 in. make in going $2\frac{1}{2}$ mi.?
70. What is the average value of 96 18-carat gold rings weighing 2 lb., at \$1.40 a pwt.?
71. How much gold may be obtained from 60 T. of rock, if it yields .0026 of its weight in gold?
72. What cost 6 lb. $9\frac{1}{2}$ oz. opium at $87\frac{1}{2}$ ct. an oz.?
73. How many watch chains each weighing 15 pwt. 16 gr. can be made from 85 oz. 5 pwt. of gold?
74. Change 24 lb. 5 oz. Troy to avoirdupois weight.
75. How many bu. of wheat will weigh as much as 96 bu. of ear corn?
76. What is the value of 2 loads of shelled corn each weighing 8297 lb. at $88\frac{1}{2}$ ct. a bu.?
77. If £1 equals \$4.86 $\frac{1}{8}$, what is the value of £8 15 s.?
78. How many city lots 4 rd. by 6 rd. can be made of 2 acres 88 sq. rd.?
79. How many sacks each holding 70 lb. will it take to hold 207 bu. 8 pk. of oats?
80. If 2588 bu. 8 pk. 7 qt. of wheat be divided equally among 14 persons, how much does each get?
81. At \$8 $\frac{1}{2}$ a rod what will it cost to put up 100 ft. of fence?
82. What will be the cost of 2 bu. 8 pk. 6 qt. 1 pt. of nuts at \$1 $\frac{1}{2}$ a bu.?
83. What cost 6 doz. gross of lead pencils at 2 pencils for 5 ct.?
84. Find the value of 2575 lb. pork at \$12 $\frac{1}{2}$ a bbl.
85. Mr. B sold 85 bu. 8 pk. 4 qt. of clover-seed at \$5.75 a bu. and took his pay in flour at \$6 a bbl. How much flour did he get?

86. Dr. H returning from Europe had 8 sovereigns, 8 crowns, 25 francs and 14 marks; what are they worth in U. S. money?

87. Which is the heavier and how much, a lb. of gold or a lb. of feathers?

88. Which is heavier and how much, an oz. of lead or an oz. of silver?

89. An iron-clad sails 18.8 knots an hr. How many common miles is that?

90. What is gained by buying 7 bu. 8 pk. 4 qt. of berries at \$1 a bu. and selling them at 8 ct. a qt.?

91. A young lady "worth her weight in gold" weighs 180 lb.; what is her weight in gold?

92. It was ascertained by taking the soundings that the sea was 770 fathoms deep; what part of a mi. was it?

93. The wheels of a locomotive are 17.6 ft. in circumference and make 5 revolutions a second; how long will it take to run 100 mi.?

94. How long would it take a person to travel around the earth, 25000 mi., at the rate of 15 mi. 62 rd. 4 yd. 2 ft. in 4 hr. 20 min. 80 sec.?

95. The difference in time between two places is 18 min. 48 sec.; the longitude of the one is $74^{\circ} 8' W.$; what is the lon. of the other?

96. At \$60 an acre, what is the value of a piece of land 140 rd. long and 125 rd. wide?

97. What cost 78 lb. 9 oz. butter at $16\frac{2}{3}$ ct. a lb.?

98. Find the sum of $\frac{1}{4}$ wk. $\frac{1}{2}$ da. $\frac{1}{4}$ hr. $\frac{3}{4}$ min.

99. The difference in time between New York and Chicago is 54 min. $80\frac{1}{4}$ sec.; what is the difference of longitude?

100. How much earlier is it noon in Boston, lon. $71^{\circ} 8' 80'' W.$, than in New Orleans, lon. $90^{\circ} 2' 30'' W.$?

101. I started on meridian $90^{\circ} W.$ lon. and traveled till

my watch was 1 hr. 15 min. slow; in which direction did I travel, and what was my longitude when I stopped?

102. May 10th a man rented a house at \$420 a yr. and occupied it until Dec. 15th; what should he pay?

103. At $\frac{3}{4}$ ct. apiece how many slate-pencils can be bought for \$ $\frac{1}{2}$?

104. From a bbl. $\frac{3}{4}$ full 7 gal. were drawn off; what part of the original contents remain?

105. Miss B. started at New York, noon June 4th and traveled eastward arriving at New York, noon Aug. 6th, 9 wk. later; Mr. T. started at the same time and place and traveled westward meeting Miss B. on her arrival at New York; how many sunsets did each see?

106. A vessel sailed from Canton at noon Mon. June 4th to Honolulu in 288 hr.; on what day of the week and month did she arrive?

107. Allowing 8 min. for transmission, at what time must a telegram be sent from London, lon. 0, to reach Washington, lon. 77° W., at 10:08 a. m.?

108. Two persons travel from different points until they meet when one finds his watch 1 hr. 16 min. fast, and the other finds his 1 hr. 52 min. slow; in what direction and through how many degrees did each travel?

109. By mistake A sets his watch an hr. too fast; if he travel at the rate of 800 mi. per day, directly east, how far will he have gone when his watch shows correct time, allowing 54 mi. to a degree?

110. When it is noon at Cincinnati, longitude $84^{\circ} 26'$ W., by Standard Time, what is it by sun time?

111. Having correct Standard time, I started at Washington, D. C., and traveled westward till my watch was 27 min. faster than sun time. In what longitude did I stop?

PRACTICAL MEASUREMENTS.**25. Surfaces.**

1. How many sq. ft. in the top of a table 6 ft. long and 8 ft. wide?

2. What is the area of a floor 26 ft. long and $14\frac{1}{2}$ ft. wide?

3. How many sq. rd. in a rectangular field 28 rd. long and 15 rd. wide?

4. How many sq. yd. in a blackboard $27\frac{1}{2}$ ft. long and 4 ft. wide?

5. How many sq. in. in a rectangular pane of glass 11 ft. long and 6 ft. 4 in. wide?

6. How many acres in a farm 32 rd. square?

7. How many acres in a road 50 mi. long and 4 rd. wide?

8. A floor 26 ft. long contains 825 sq. ft.; how wide is it?

9. What is the length of a lawn that contains 805 sq. yd. and is 45 ft. wide?

10. How many boards 6 in. wide and 12 ft. long, will be required to floor a room 80 ft. by 24 ft.?

11. How many sq. ft. in the walls of a room 25 ft. long, 17 ft. 6 in. wide, and 9 ft. 6 in. high?

12. What is the surface of a cubical box, each of whose dimensions is 3 ft. 8 in.?

13. How many acres in the N. E. $\frac{1}{4}$ of S. E. $\frac{1}{4}$ of Sec. 15?

14. What is the value of the W. $\frac{1}{2}$ of N. E. $\frac{1}{4}$ of S. W. $\frac{1}{4}$ of Sec. 4, Tp. 19, R. 3 E. of 3 P. M., at \$56 an acre?

15. A building lot is 150 feet front and contains $1\frac{1}{2}$ acres; how far back does it extend?

16. What is the area of the gable end of a house 29 ft wide, the ridge 12 ft. higher than the wall?

17. The area of the two gables of a house is 92 sq. yd., the base being 42 ft.; find the height of the ridge.

18. How many slates 12 by 24 in., $\frac{1}{2}$ exposed to the weather, will it take to cover a roof 96 ft. long and 40 ft. from eaves to ridge?

19. What will it cost, at 45 ct. a sq. yd., to cement a cellar floor 40 ft. 6 in. long and $25\frac{1}{2}$ ft. wide?

20. What is the expense of plastering a room 64 ft. by 28 ft. 8 in., 17 ft. ceiling, at 85 ct. per sq. yd.?

21. Find the cost of carpeting a room $18\frac{1}{2}$ ft. by 16.4 ft., carpet $\frac{7}{8}$ yd. wide, at \$1.15 a yd.

22. How many yd. in length of carpeting are required to cover a floor 27 ft. by 24 ft. 9 in., carpet 27 in. wide?

23. What is the cost of covering a floor 60 ft. by 80 ft. 4 in., with carpet a yd. wide, at \$1.85 a yd.?

24. How many yd. silk $\frac{5}{8}$ yd. wide will it take to line 82 yd. satin $\frac{3}{4}$ yd. wide?

25. A garden 160 ft. long and 120 ft. wide is surrounded by a walk 7 ft. wide; how much ground in the walk?

26. How many tulips in rows 9 in. apart and $4\frac{1}{2}$ in. from the edge, can be set in a bed 24 ft. by 6 ft.?

27. A field 80 rd. long contains 15 acres, while another field of the same width contains 9 acres; what is the length of the latter field?

28. What will it cost to fence a W. half-quarter section of land, the fence 8 rails high, 2 panels to the rod, and rails costing \$88 per M?

29. How much less will it cost to fence a field 72 rd. sq. than a rectangular field of the same area and 8 times as long, if fencing cost \$2.15 a rd.?

30. How much less will it cost to fence a field 64 yd. square than a rectangular field $\frac{3}{4}$ as wide and of the same area, if fencing cost \$2.60 a rd.?

31. Find the cost of slating a roof 64 ft. 9 in. long and 24 ft. from eave to ridge, at \$18 $\frac{3}{4}$ per square.

32. What will be the cost of the shingles to cover a roof 65 ft. long and 80 ft. from the ridge to the eaves, each shingle (18 in. by 4 in.) exposed $\frac{1}{3}$ to the weather, the first course double, and the shingles costing \$8.50 per M?

33. The ridge of a house is 46 ft. in length and the rafters 18 ft. 9 in. If the shingles are laid $4\frac{1}{2}$ in. to the weather and the first course on each of the eaves double, what will they cost at \$4 per M?

34. The length of a house is 40 ft. and the rafters 16 ft. long; what will it cost to tin the roof at \$6 a square?

35. How many acres in a street $\frac{3}{4}$ mi. long and 60 ft. wide?

36. A frame house, in shape of a T is 186 ft. in girth, 18 ft. high, and each of its three gables is 16 ft. wide and 8 ft. higher than the walls; what will it cost to paint it at 21 ct. per sq. yd.?

37. How many yd. of Brussels carpet $\frac{3}{4}$ yd. wide will it take to carpet a parlor 24 ft. long and 18 ft. wide, the strips running lengthwise and the matching of figures requiring a loss of 10 in. on each strip except one?

38. Find the cost of carpeting a room 38 ft. by 24 ft. with Brussels carpet, at \$1.50 a yd., the strips running lengthwise, allowing 6 in. for matching.

39. What cost a half mi. of concrete sidewalk, $5\frac{1}{2}$ ft. wide, at \$1.25 a yd.?

40. How many rolls of paper 8 yd. long and 18 in. wide will paper the walls and ceiling of a room 16 ft. by 14 ft. with a 10 ft. ceiling, deducting 124 sq. ft. for doors and windows?

41. What is the cost of papering two rooms, both walls and ceilings, one of them 16 ft. square, the other $18\frac{1}{2}$ ft. by 15 ft., ceilings each $7\frac{1}{2}$ ft. high, each bolt of paper containing 28 sq. ft., at 36 ct. a bolt, deducting 25 sq. ft. for each of 7 doors and windows, and allowing 12 ct. a yd. for border?

42. A lady wishes to carpet, crosswise, two rooms, each 16 ft. by 18 ft., with ingrain carpet, 1 yd. wide worth 90 ct. a yd.; how much will it cost, there being a waste of 10 in. on all of the strips but one?

43. What will it cost to carpet a room 27 ft. 6 in. by 18 ft. with carpet 27 in. wide, at \$1.20 a yd.?

44. Find the cost of papering the walls and ceiling of a room 24 ft. long, 16 ft. wide, 12 ft. high, with paper containing 82 sq. ft. in each roll, at \$.80 a roll.

45. How many rolls of paper 8 yd. long 18 in. wide, must be ordered to cover the walls and ceiling of a room 105 ft. in girth ($80 \times 22\frac{1}{2}$), 10 ft. 8 in. high, deducting 142 sq. ft. for openings?

46. The cost of carpeting a room 20 ft. long 18 ft. wide with Brussels $\frac{3}{4}$ yd. wide, at \$1.50 a yd., the strips running lengthwise, is \$88; how much is the waste on each strip in matching figures?

47. At 80 ct. per sq. yd., what cost the plastering of a three-story, 12 room house, there being on each story 4 rooms 14 ft. by 16 ft. and a hall 30 ft. by 18 ft.; the first story is 12 ft. high, the second 9 ft., and the third $8\frac{1}{2}$ ft., no allowance for openings?

48. Find the cost of carpeting a stairway having 19 steps, each having $10\frac{1}{2}$ in. tread and 7 in. rise, allowing 1 in. to each step for the nosing and 1 yd. for landing, carpet costing 80 ct. per yd.?

Solids.

49. What are the solid contents of a cube each edge of which measures 2 yd. 1 ft.?

50. A cistern 8 ft. square contains 820 cu. ft.; how deep is it?

51. At 25 ct. a cu. yd. what will be the cost of excavating a basement 72 ft. long 48 ft. wide 7 ft. 3 in. deep?

52. The seating capacity of a church 80 ft. long 60 ft. wide and 36 ft. high is 1200; how long before the air contained in it becomes unfit for respiration, allowing 10 cu. ft. a min. to each person?

53. How many cords of wood in a pile 56 ft. long 12 ft. wide and 6 ft. high?

54. A pile of wood 8 ft. high and 12 ft. wide contains $16\frac{1}{2}$ cords; how long is it?

55. What costs a pile of wood 27 ft. 6 in. long 4 ft. wide 11 ft. 8 in. high, at $\$2\frac{1}{2}$ a cord?

Lumber.

56. How many ft. of lumber in a board 16 ft. long 8 in. wide and 1 in. thick?

57. How many board-ft. in 12 planks 21 ft. long 18 in. wide and $2\frac{1}{2}$ in. thick?

58. How many board-ft. in 14 planks 16 ft. long 16 in. wide and 4 in. thick?

59. What is the cost of 40 boards 12 ft. long 15 in. wide, at $\$2.60$ per 100 bd.-ft.?

60. How long is a board 9 in. wide containing 10 bd.-ft.?

61. How much may be cut from a board 14 ft. long 20 in. wide, so as to leave 14 board-ft.?

62. What is the cost of 18 pieces of scantling 4x5 in. and 10 ft. long, at $\$17\frac{1}{2}$ per M bd.-ft.?

63. What will it cost to floor a 3-story building 82 ft. by 25 ft., with 2 in. plank, at $\$80$ per M bd.-ft.?

64. Find the cost to inclose and fence, in four square fields, a quarter section of land, posts 8 ft. apart and costing 12 ct. each, fence 6 boards high each 16 ft. long 6 in. wide, at $\$14$ per M bd.-ft.

65. What is the difference in the cost of the posts required to inclose a square $\frac{1}{4}$ sec. of land the posts 8 ft. apart, and building 2 mi. straight fence, posts $\frac{1}{2}$ rd. apart, a post costing in each case 11 ct.?

66. Find the value of the lumber, at $\$28$ a M, required to build 500 yd. of plank sidewalk 10 ft. wide 2 in. thick, and resting on 4 continuous stringers of scantling 4 in. square.

67. How much inch lumber will it take to make a cubical box 4 ft. square, outside measure?

68. How many ft. of inch boards are needed to make 12 piano boxes the interior dimensions of which are 2 ft. 7 in., 4 ft. 11 in., and 5 ft. 9 in.?

69. Find the cost of the following bill of lumber at an average of \$18 per M:—

140 pcs. siding 16 ft. by 12 in. 66 rafters 18 ft. by 8x5 in.
60 planks 10 ft. by 10x8 in. 96 pcs. studding 12 ft. by
44 joists 16 ft. by 10x2½ in. 2x4 in.
64 scantling 16 ft. by 2x4 in. 10 sills 18 ft. by 10x10 in.

70. Find the cost of inch ash flooring for two rooms each 15 by 16 ft., at \$32 per M; 118 boards 12 in. by 18 ft., at \$16 per M; 45 planks 8½ by 16 in. by 14 ft., at \$9.50 per M; 84 joists 4 by 12 in. by 20 ft., at \$14 per M; 75 scantling 8½ by 4½ in. by 14 ft., at \$16 per M; 24000 shingles at \$8.50 per M.

71.

Decatur, Ill., June 6, 1894.

A. H. Humphrey bought of Huff Bros. Lumber Co.

320	Pieces 2x 4—14 ft. S. 2 S. @ \$16 M.	2986½ ft.	\$47.78½
4	" 8x10—16 " @ \$18.		
4	" 8x10—14 " "		
32	" 2x10—16 " "		
32	" 2x 8—16 " "		
32	" 2x 6—16 " "		
180	" 1x 4—18 " S. 1 S. @ \$16.		
1800	ft. A Siding 16 " @ \$28.		
1650	" Ship lap 14 " @ \$17.		
980	" 1x4—16 W. A. Flooring @ \$37.		
10	M Ex. A. W. P. shingles @ \$8.25.		
14	Sash 24x36 @ \$2.		
140	ft. Cornice complete @ 14c.		

Masonry and Brick Work.

72. What is the cost of a brick walk 400 ft. long 6 ft. wide, bricks 8 by 4 by 2 in., laid flat, at \$6 per M?

73. Find the cost at $7\frac{1}{2}$ per M, of a brick walk $5\frac{1}{2}$ ft. wide around a block 320 ft. square inside of the walk.

74. What is the cost of the common brick, at \$8 per M, required to pave a street a mi. long, 50 ft. wide, the first layer laid flat and the second on edge?

75. If the cost of paving $11\frac{1}{2}$ mi. of streets, at \$1.70 a sq. yd. is \$412,896, what is the average width of the street?

76. What is allowed in the next above for labor, curbing, etc., if in the first layer the bricks are laid flat and the second on edge, the cost being $\$7\frac{1}{2}$ per M?

77. What will it cost to floor a cellar of two rooms, one 16 by 28 ft., the other 14 by 16 ft., with common brick at \$7 per M?

78. The brick in a walk, 6 ft. wide around a square block, cost \$297.482, at \$9 per M. Required the size of the block.

Illinois rule for counting brick in the wall, measured outside, no allowance for corners or openings narrower than 8 ft.

8 in. wall 15 bricks to the sq. ft.

12 " " $22\frac{1}{2}$ " " "

16 " " 30 " " "

Another rule.—1 brick thick 7 to the ft.; 2—14; 3—21.

79. What cost the brick in a house 40 ft. square and 22 ft. high, the walls 8 bricks thick, at \$10 per M?

80. What will be the cost of digging and walling a cellar 40 ft. by 24 ft. 6 ft. deep, the wall $7\frac{1}{2}$ ft. high and 18 in. thick, if the excavating cost 45 ct. a load and the masonry \$4.25 a perch?

81. How many common bricks are required to put up a building 100 ft. long 72 ft. wide and 40 ft. high, with an inner wall running lengthwise, the walls 16 in. thick, deducting 800 ft. for doors and windows?

82. At \$8.50 a perch what costs a stone foundation 4 ft. 6 in. high 22 in. thick, for a building 120 ft. long and 100 ft. wide, with an inner wall running each way, and 8 pillars 18 in. by 2 ft.?

83. How many bricks are required to build a flue $2\frac{1}{2}$ bricks wide and 2 bricks thick, 85 ft. high, allowing $\frac{3}{8}$ of an in. to each brick for mortar?

84. How many bricks $8\frac{1}{2}$ in. by $4\frac{1}{8}$ in. by $2\frac{3}{8}$ in. will be required to build a house 36 ft. square, 24 ft. 6 in. high, the wall being $12\frac{1}{8}$ in. thick, allowing for an opening 12 ft. high by 20 ft. 5 in. wide, and $\frac{1}{4}$ in. for mortar to each brick?

85. How many perches of stone in the basement walls of a building 84 ft. long, 48 ft. wide, the wall being 2 ft. 8 in. thick, with a partition wall 2 ft. thick running lengthwise, and the whole 8 ft. 4 in. high?

86. A layer of common bricks placed in position, without mortar, for building a flue makes an opening 12 in. by 24 in.; how high a flue may be built of 1,485 bricks, allowing $\frac{1}{4}$ in. in thickness to each brick for mortar?

Capacity.

87. A trough is 2 ft. deep 2 ft. wide and 12 ft. long; how many gallons of water will it hold?

88. How many gallons will a rectangular vat 6 ft. long 5 ft. wide and 4 ft. deep contain?

89. A watering trough is made of 3 2-inch plank, a ft. wide and 16 ft. long, the bottom being nailed to the sides, and boards nailed on the ends. How many gallons will it hold? How many gallons will the same watering trough hold, if the sides are nailed to the bottom?

90. How many 40-gal. bbl. of water will a cubical cistern contain that is 8 ft. square and 8 ft. deep?

91. What is the capacity in bu. of a bin 16 ft. square and 8 ft. deep?

92. What is the weight of the water in a tank 7 ft. square by 9 ft. deep, when it is $\frac{3}{4}$ full?

93. A tank 7 ft. by 5 ft. by 6 ft. can be emptied by a pipe in 2 hr.; how many gallons are discharged per minute?

94. A reservoir 54 ft. long 32 ft. wide and 10 ft. deep is $\frac{3}{4}$ full, when it becomes necessary to draw off the water to clean it out; what will it cost to pump it out at 5 ct. a hhd.?

95. A cistern whose length was 14 ft., width 10 ft., contained 100 hhd. of water; how deep was it?

96. How many bu. of wheat in a rectangular bin 12 ft. by 8 ft. by 7 ft.?

97. What is the width of a bin 24 ft. long 8 ft. 4 in. deep to contain 600 bu. of grain?

98. What is the value, at $62\frac{1}{2}$ ct. a bu., of a bin of barley 8 ft. long 6 ft. wide and 6 ft. deep, $\frac{3}{4}$ full?

99. An elevator containing 5,000 bu. of grain is 32 ft. long 16 ft. wide; what is its depth?

100. An ice-house 40 ft. long 25 ft. wide and 20 ft. high, is filled with ice; how many tons does it contain, allowing $\frac{1}{4}$ for sawdust, if a cu. ft. of ice weighs $58\frac{1}{2}$ lb.?

101. How many bbl. of flour can be made from the contents of a bin of wheat 12 ft. long $7\frac{1}{2}$ ft. wide 6 ft. deep, $\frac{3}{4}$ full, if a bu. makes 40 lb. of flour?

102. A wide wagon-bed is 8 ft. 4 in. wide, inside measure, and a narrow bed is 3 ft.; each is 10 ft. long, with three pairs of side boards, the first 14 in. wide, the second 12 in., and the third 10 in.; how much more oats will John haul in a week in the wide box than James in the narrow, each hauling 10 loads daily?

103. How many bu. of ear corn, 4000 cu. in. to the bu., in a square pen $8\frac{1}{2}$ ft. high, made of 10 ft. rails which lap 6 in.?

104. What is the value of two cribs of corn, each 82 ft. long 4 ft. wide at bottom and 5 ft. at top, 8 ft. high, at 86 ct. per bu. of 8880 cu. in.?

105. How much is cleared on a quarter section of land which produces two loads of corn to the acre, the dimensions of the wagon box being 10 ft. by 8 ft. by 25 in., 4,000 cu. in. to the bu., when corn is worth 88 ct. per bu., rent \$4.50 per acre, allowing \$4.75 per acre for raising, and 2 ct. per bu. for husking?

106. How many rail pens $9\frac{1}{2}$ ft. square, inside measure, and $8\frac{1}{2}$ ft. high are required to hold the above 160 acres of corn?

107. A crib filled with corn in the ear measures on the inside 18 ft. 4 in. in length by 5 ft. 9 in. in width and 8 ft. 6 in. in height; what is the value of the corn when shelled at 45 ct. per bu. 8888 cu. in. = 1 bu.

108. To what depth will 8 bbl. of oil fill a rectangular tank 9 ft. square?

109. How much water will fill a vat $6\frac{1}{2}$ ft. square to a depth of $4\frac{1}{2}$ ft.?

110. How much is the volume increased, if 40 gal. of water is frozen to solid ice?

1 cu. ft. water = 1000 oz.; 1 cu. ft. ice = 58 $\frac{1}{2}$ lb.

111. Two cakes of ice a foot square and 18 in. long placed side by side just fill the ice-box of a refrigerator; to what depth will the water fill the box when the ice melts?

112. When the ice is 16 in. thick, how much surface will furnish 1,000 tons, no allowance for waste?

113. At 55 ct. a ton what is the cost of mining 25 cars of coal each car $82\frac{1}{2}$ ft. long $8\frac{1}{2}$ ft. wide $2\frac{1}{16}$ ft. deep, coal weighing 80 lb. to the bu.?

PERCENTAGE.

26. Exercises and problems in percentage.

What is

1. .08 of 490? 8% of 490?
2. .16 of 1600? 16% of 1600?
3. .45 of \$17? 45% of \$17?
4. .06 $\frac{1}{2}$ of \$500? 6 $\frac{1}{2}$ % of \$500?
5. 1.12 times \$180? 112% of \$180?

Find

6. 12% of 500 bu.; 12 $\frac{1}{2}$ %; 16 $\frac{2}{3}$ %.
7. 16% of 750 sheep; 16 $\frac{2}{3}$ %; 66 $\frac{2}{3}$ %.
8. 87% of \$880; 87 $\frac{1}{2}$ %; 62 $\frac{1}{2}$ %.
9. 108% of \$960; 108 $\frac{1}{3}$ %; 18 $\frac{1}{3}$ %.
10. 88 $\frac{1}{3}$ % of 999 lb.; 188 $\frac{1}{3}$ %; 8 $\frac{1}{3}$ %.
11. 12% of 875.
12. 7% of \$240.
13. 10% of 892 ft.
14. 40% of 2,467 lb.
15. 75% of \$704.
16. 87 $\frac{1}{2}$ % of .1876.
17. 7.5% of 458.
18. $\frac{7}{8}$ % of $\frac{1}{4}$.
19. 250% of 1,440 oz.
20. $\frac{7}{8}$ % of \$ $\frac{1}{4}$.
21. 16 $\frac{2}{3}$ % of 1,260 yd.
22. 12 $\frac{1}{2}$ % of 648 oz.
23. 85% of 2,572 in.
24. 125% of 606.8 gal.
25. 42 $\frac{5}{7}$ % of 686 mi.
26. 25% of 55 $\frac{1}{3}$ yd.
27. $\frac{3}{4}$ % of 170 ft.
28. .8% of $\frac{7}{8}$ pt.
29. 800% of 96 ft.
30. .9% of 900.
31. What is 4% of 850+6% of 900+8 $\frac{1}{2}$ % of 800?
32. What is 4 $\frac{1}{3}$ % of \$600+12 $\frac{1}{2}$ % of \$620+16 $\frac{2}{3}$ % of \$585?
33. What is 12% of \$1,500+40% of \$995+6 $\frac{1}{4}$ % of \$640?
34. Find $\frac{1}{2}$ % of \$800+ $\frac{7}{8}$ % of \$1,280+6 $\frac{2}{3}$ % of \$859.50.
35. Find 6 $\frac{2}{3}$ % of \$8,225.45-14 $\frac{3}{4}$ % of \$541.10.
36. Find 6 $\frac{1}{2}$ % of \$1,050+5 $\frac{5}{8}$ % of \$800.
37. Find 68% of 16 T.-2 $\frac{7}{8}$ % of 78 T.
38. Find 42 $\frac{1}{2}$ % of 18 lb. 6 oz. 4 pwt.

39. Find $\frac{4}{5}\%$ of $600 + \frac{1}{2}$ of $12\frac{1}{2}\%$ of 288.
40. If I earn \$1,200 and spend $88\frac{1}{3}\%$ of it, what do I save?
41. An agent collects \$82,900 and gets $2\frac{1}{2}\%$ for collecting; what sum does he receive for his services?
42. An agent sold goods to the amount of \$1,250, receiving 4% for selling; what sum does he receive?
43. Which is the better and how much, to sell \$800 worth of goods at 40% profit, or \$8,000 worth at 5% profit?
44. How much can I save in 8 yr. from a salary of \$1,500 a yr., if $88\frac{1}{3}\%$ of it is spent for provisions and $62\frac{1}{2}\%$ of the remainder for other expenses?
45. A grocer invests \$1,250 in goods, 25% in flour, $87\frac{1}{2}\%$ in sugar, and the remainder in coffee at $17\frac{1}{2}$ ct. a lb.; how much coffee does he buy?
46. 1 is .01 of what number? 1% of what?
47. 24 is .06 of what number? 6% of what?
48. 60 is 12 times what number? 12% of what?
49. \$1,750 is 25 times what number? 25% of what?
50. \$72.82 is 5% of what number? 10% of what?
51. 10% of a number is 972; what is the number?
- | What % is | What % of |
|---|---|
| 52. \$9 of \$12? | 64. 890 lb. is 120.15 lb.? |
| 53. 112 of 280? | 65. \$86 is \$88.40? |
| 54. 160 of 960? | 66. 10 gal. is 3 qt.? |
| 55. 980 yd. of 1,470 yd. | 67. 3 bu. is 1 pk.? |
| 56. 9.38 in. of 9.82 in.? | 68. 4.5% is $3.87\frac{1}{2}\%$? |
| 57. 6.04 mo. of 5.486 mo.? | 69. 1 lb. avoird. is 1 lb. Troy? |
| 58. \$450 $\frac{3}{4}$ of \$8,606? | 70. 28.35 gal. is 5.3156 $\frac{1}{4}$ gal.? |
| 59. $\frac{2}{3}\frac{1}{2}$ of $\frac{5}{10}\frac{4}{5}$? | 71. 18 $\frac{3}{4}$ oz. is $8\frac{3}{4}$ oz.? |
| 60. 10 qt. of 1 bu.? | 72. 182.4 lb. is $1\frac{1}{4}$ lb.? |
| 61. $\frac{1}{3}$ of $\frac{5}{8}$? | 73. $2\frac{1}{2}$ is $\frac{3}{4}$? |
| 62. $\frac{2}{3}$ of $\frac{1}{4}$? | 74. 8 acres is 80 sq. rd.? |
| 63. 880 ft. of 1 mi.? | 75. 3 pk. 2 qt. is 5 qt.? |

76. 785 is 6% of what? 88. 624 is 200% of what?
 77. 1 pt. is $12\frac{1}{2}\%$ of what? 89. $\$8\frac{2}{3}$ is $16\frac{2}{3}\%$ of what?
 78. 224 lb. is 40% of what? 90. $\$2\frac{1}{2}$ is $\frac{1}{4}\%$ of what?
 79. 54 is 15% of what? 91. 1 ch. is $1\frac{1}{4}\%$ of what?
 80. $\$87\frac{1}{2}$ is $2\frac{1}{2}\%$ of what? 92. $\$80$ is $\frac{5}{8}\%$ of what?
 81. 79.2 yd. is $7\frac{1}{2}\%$ of what? 93. $\frac{1}{2}$ ct. is $\frac{5}{8}\%$ of what?
 82. 87.5 ct. is $87\frac{1}{2}\%$ of what? 94. $138\frac{1}{4}$ is $108\frac{1}{3}\%$ of what?
 83. 8 qt. is 15% of what? 95. $\frac{1}{11}$ is 105% of what?
 84. 96 is $28\frac{1}{2}\%$ of what? 96. $\frac{1}{10}$ is 95% of what?
 85. $\$450\frac{3}{4}$ is $12\frac{1}{2}\%$ of what? 97. $99\frac{2}{3}$ gal. is $108\frac{1}{3}\%$ of what?
 86. 1,582 is 113% of what? 98. 892 is $88\frac{1}{3}\%$ of what?
 87. $\frac{1}{4}$ lb. is $7\frac{1}{2}\%$ of what? 99. $\frac{4}{5}$ is $\frac{3}{4}\%$ of what?
 100. 165 is 10% more than what? 10% less?
 101. $\$14$ is $8\frac{1}{3}\%$ more than what? $8\frac{1}{3}\%$ less?
 102. 245 ft. is 51% less than what?
 103. What number increased by 18% of itself equals 295?
 104. What number plus $187\frac{1}{2}\%$ of itself equals 644?
 105. What fraction diminished by 36% of itself = $\frac{2}{3}$?
 106. What fraction less $37\frac{1}{2}\%$ of itself equals $\frac{1}{2}$?
 107. $79\frac{1}{2}$ is 175% more than what number?
 108. $80\frac{1}{2}$ is 300% more than what number?
 109. What is the value of $\frac{1}{6}$ of $4\frac{1}{2}\%$ of $\frac{5}{8}$ ton?
 110. $\frac{3}{8}$ of $\frac{4}{5}$ of a yd. equals $138\frac{1}{3}\%$ of what?
 111. 25% of $\frac{2}{3}$ of an article is how many % of $\frac{3}{4}$ of it?
 112. 80% of $\frac{5}{8}$ of an article is how many % of all of it?
 113. $\frac{2}{3}$ of $\$25$ is what % of $\frac{7}{8}$ of $\$64$?
 114. 85 A. 64 P. is $16\frac{2}{3}\%$ of how much land?
 115. 7 lb. 5 oz. 8 pwt. is $33\frac{1}{3}\%$ more than what?
 116. $\$1,910$ is $4\frac{1}{2}\%$ less than what?
 117. $33\frac{1}{3}\%$ of 480 is $33\frac{1}{3}\%$ less than what?
 118. 25% of 560 is $16\frac{2}{3}\%$ more than what?

119. From a bin containing 750 bu., 125 bu. were taken; what % remained?

120. If I buy 1,200 lb. sugar and sell 750 lb. at $5\frac{1}{2}$ ct. a lb., what per cent have I left?

121. The bread made from a bbl. of flour weighs $81\frac{1}{4}\%$ more than the flour. What is the weight of the bread?

122. A and B each invest \$3,200 in business; at the end of the year A has gained $6\frac{1}{8}\%$ and B has lost $5\frac{1}{4}\%$; how much has each?

123. Bought 180 doz. eggs, but $8\frac{1}{4}$ doz. were broken; what per cent. were good?

124. I paid \$80 at the rate of $\frac{5}{8}\%$ for getting some property sold; for how much did it sell?

125. A man's income is \$1,886.75, and he spends \$806 $\frac{1}{8}$; what per cent. does he save?

126. Mr. S. invests $88\frac{1}{4}\%$ of his money in R. R. Bonds and had \$4,010 left; what sum had he at first?

127. A team and wagon were sold for \$850, which was $16\frac{2}{3}\%$ more than cost; what was the cost?

128. I expended 25% of my salary for current expenses, $12\frac{1}{2}\%$ for rent, 20% for provisions, 20% for clothing, and had \$387.50; what was my salary?

129. A grocer has 10% of his capital invested in sugar, 15% in canned goods, 25% in flour, $88\frac{1}{4}\%$ in fruits and the remainder, \$456, in coffee and spices; what sum is invested in each kind of goods?

130. I had \$820 in bank and increased it to \$860; what per cent. of increase did I make?

131. A merchant sells goods for \$1,666.50, which is 10% more than they cost; what did they cost?

132. A bankrupt whose assets are \$94,500 pays 80% of his liabilities; what are his liabilities?

133. B sold C a piece of land at a profit of $87\frac{1}{2}\%$, who

PERCENTAGE.

improved it and sold it to D at a profit of 25% on the purchase price receiving \$6,050; what did the land cost B?

134. If a man owning 80% of a mill sells $15\frac{1}{4}\%$ of his share for \$924.80, what is the mill worth?

135. My income last year was \$900 and, my expenses \$678; what % of my income did I save?

136. A regiment went into battle with 960 men and came out with 600 men; $12\frac{1}{2}\%$ of the lost were killed; what % of the whole army were the lost who were not killed?

137. A man sold a quarter section of land for \$9126.40, which was 8% less than the cost; what was the cost per acre?

138. A farmer's oats crop last year was $7\frac{1}{2}\%$ more than it was this year; what was his crop this year if in the two years he raised 996 bu.?

139. A dealer in real estate sold two lots for \$2780 each; on the one he gained 30% and on the other he lost 30%; did he gain or lose and how much?

140. A lady's cloak cost \$85; the making cost $83\frac{1}{3}\%$ less than the cloth, and the trimmings 25% more than the cloth; what did each cost?

141. A cask containing 76 gal. 2 qt. leaked 28 gal. $2\frac{1}{4}$ qt.; what % leaked out?

142. A man drew $83\frac{1}{3}\%$ of his bank deposit, $62\frac{1}{2}\%$ of which he paid for a horse worth \$125, and then deposited the remainder; what per cent of his original deposit was now in bank?

143. A merchant started in business with a certain capital; the first year he lost $8\frac{1}{3}\%$ of it; the second year $9\frac{1}{11}\%$ of the remainder; and the third year 10% of the rest when he had \$15000 left. How much capital had he on commencing business?

144. In a battle 5% of an army were killed, $12\frac{1}{2}\%$ of the remainder were wounded, and $16\frac{2}{3}\%$ of the wounded died; there were 580 more killed than mortally wounded; how many men were in the army?

SANTA CLARA COUNTY
TEACHERS' LIBRARY
No.

PROFIT AND LOSS.**27. Problems in Profit and Loss.**

1. Cost \$540; profit 27%; find the gain.
2. Cost \$84; loss 40%; find the selling price.
3. Profit $12\frac{1}{2}\%$; selling price \$37.80; find the cost.
4. Gain $16\frac{2}{3}\%$; cost \$108; find the selling price.
5. Sold for \$22 $\frac{1}{2}$, at 20% profit; find the cost.
6. Cost \$217.60; selling price \$244.80; find gain %.
7. Gain 27%; cost \$6240; find the selling price.
8. \ Cost \$12 $\frac{1}{2}$; loss $9\frac{1}{2}\%$; find the selling price.
9. \ Lost \$2.75, at $6\frac{1}{4}\%$; what was the cost?
10. \ Selling price \$6; cost \$2 $\frac{1}{2}$; find the gain %.
11. Profit $7\frac{1}{4}\%$; cost \$168; find the selling price.
12. \ The gain is \$10.80 at 12%; find the selling price.
13. Cost \$1,750; selling price \$500; find the loss %.
14. \ Loss \$185; selling price \$25; find the loss %.
15. Selling price \$9,780; gain $27\frac{1}{3}\%$; find cost.
16. Loss 18% by selling at \$444.44; find the cost.
17. Selling price \$6; rate of loss $12\frac{1}{2}\%$; find cost.
18. Gain 10%; selling price \$9.8; find the cost.
19. Cost \$190; profit $12\frac{1}{2}\%$; find selling price.
20. Cost $18\frac{3}{4}$ ct.; loss 20%; find selling price.
21. Selling price \$550; loss $16\frac{2}{3}\%$; find cost.
22. \ Loss 15%; selling price \$207.40; required the cost.
23. \ Bought a lot for \$640 and sold it at a gain of 12%; what was the gain?
24. \ Sold a house costing \$8,600 at a loss of $5\frac{1}{4}\%$; what was the selling price?
25. I sold stationery marked \$6.50 at 10% and 10% off; find the selling price.
26. \ By selling a property at \$900 I gained 20%; what would be the rate at \$650?

27. A bill of goods at list prices amounts to \$672; the discounts are 80%, 10% and 5%; what is due on this bill?

28. What is the difference on a bill of \$1,800 between a discount of 80% and a discount of 25% and 5%?

29. If I buy a bill of goods amounting to \$800 at 20% and 10% off, and sell them at 20% and 10% on, what is my gain per cent?

30. If I buy at 20% off and sell at 20% on, what per cent. of profit do I make?

31. \ Cost \$1.50; from what price can I deduct 10% and still make 20%?

32. A merchant's income at a gain of $18\frac{1}{4}\%$ on his capital is \$2,880; what would be his income at a gain of 25% on his capital?

33. A merchant buys a case of boots for \$40, 10% and 10% off for cash; how shall he mark each pair to gain $16\frac{2}{3}\%$, if his key for cost mark is "toughbread," and for selling mark "now be quick?"

34. A grocer buys goods to the amount of \$11,250; what is the amount of his sales on those goods to realize 20% profit, allowing $6\frac{1}{4}\%$ for bad debts?

35. What is the cost of an overcoat marked \$15.225, which has been marked to net the clothier 16%, allowing 5% for cost of selling?

36. The net cost of a bill of goods was \$648, there being the following discounts: 25%, 20%, 25%, and 10%; what was the list price?

37. A merchant marks down some out-of-style goods $12\frac{1}{2}\%$; how shall he mark to the nearest half cent those selling at $12\frac{1}{2}$ ct., $18\frac{3}{4}$ ct., $87\frac{1}{2}$ ct., 75 ct., \$1.87 $\frac{1}{2}$?

38. How much is gained on a lot of drugs billed at \$48, bought at 10% discount and sold at 25% on from list price?

39. A lot of Brussels carpets were bought of a manufacturer and marked at \$1.25 a yd., which was $11\frac{1}{4}\%$ above the price for which they were sold; if $28\frac{1}{4}\%$ was gained, what was the cost?

40. By reducing the selling price of a house \$487.50, the per cent of profit is reduced from $87\frac{1}{2}\%$ to 25% ; what is the reduced selling price of the house?

41. A dealer in city lots bought 25 for \$22,500, and sold 20 of them for what all cost; what was his gain %?

42. By selling 12 bu. chestnuts at \$11.88 less than cost I lose 22% ; at what must they be sold per bu. to gain 16% ?

43. By selling coffee at 21 ct. a lb. a grocer makes $81\frac{1}{4}\%$. If he mix it with chicory costing 10 ct. a lb. in the proportion of 2 lb. of coffee to 1 lb. of chicory and sell the mixture at the same price, what per cent. does he gain?

44. I sold a horse for a certain sum and gained 20% ; I purchased another with the money and sold it at a loss of 20% ; my whole loss was \$4.80; find the cost of the first horse.

45. A merchant began business with a certain capital which he increased the first year 20% ; on this capital he gained the second year 25% ; and the third year he gained 40% , when he was worth \$42,000; with what capital did he begin?

46. For what sum must goods costing \$50,000 be sold to gain 25% , allowing 2% for waste and shrinkage, and 20% of the sales for expenses and bad debts?

47. A man doubles the amount invested for three successive years, when he has \$5,600 more invested than at first; with what sum did he begin?

48. A gain of 20% on $\frac{1}{3}$ of a stock of goods and a loss of 25% on the remainder, is a gain or loss of how many per cent. on the whole?

COMMISSION.**28. Problems in Commission.**

1. Find the commission on a sale of \$7,200 at 2% commission. On \$17,500 at $1\frac{1}{4}\%$ com.
2. What is the commission at 3% on a sale of 540 bbl. of flour at \$6.87 $\frac{1}{2}$ a bbl.?
3. A lawyer collected 65% of a debt of \$1,900, charging $8\frac{1}{4}\%$ commission; what sum should he pay over?
4. A sells B's consignment of grain for \$1,985 at 2% commission; how much does A remit B?
5. Pratt & Co. send their agent \$1,890 to buy oats at 5% com.; how many bu. can he buy at 24 ct. a bu.?
6. A factor sold 2,460 bu. of wheat at 65 ct. a bu., and remitted to the owner \$1,559.025; what was the rate of commission?
7. An agent's commission for selling a house and lot was \$224; the proceeds of the sale were \$6,176; what was the rate of commission?
8. My agent bought 3,800 bbl. of apples at \$1.75 a bbl., com. 4%; at what price per bbl. must they be sold to gain 10%?
9. An agent sold 120 bales of cotton, each bale weighing 880 lb., at 11 ct. a lb., at a commission of $2\frac{3}{4}\%$; what was his commission?
10. Paid an agent \$6.90 drayage and \$29.85 freight on goods worth \$6,800; his entire bill was \$6,510; what was the rate of commission?
11. What was the selling price per bbl., if the commission on 120 bbl. of flour was \$17.55 at $2\frac{1}{4}\%$?
12. A merchant sent an agent \$1,613 to buy goods; the agent charged freight \$14 and $2\frac{1}{4}\%$ com.; what was the value of the goods?

13. An agent charged 2% commission and \$48.20 expenses for selling a farm, and sent the owner \$14,451; for what did the farm sell?

14. A factor sold \$22,500 worth of goods at 10% commission, and invested the proceeds in cotton at 5% commission; what was the value of the cotton?

15. A commission merchant sold 260 bales of cotton at \$28.75 a bale, at 8% com., and invested the net proceeds in coffee at 25 ct. a lb.; how many lb. did he buy, com. 2%?

16. I sold goods on commission at 5% through an agent who charged me 8%; my commission after paying my agent was \$194; what sum did my employer receive?

17. I sold a consignment of corn, commission 4%, and invested the net proceeds in flour, commission 2%; my whole commission was \$860; what was the value of each?

18. A commission merchant in New York received a consignment of 9,250 bu. of corn from Chicago which he sells at 50 ct. a bu.; after deducting \$120 for freight and storage he remits to Chicago \$4,848 $\frac{1}{2}$; what is the rate of commission?

19. A cotton dealer in New Orleans shipped \$20,000's worth of cotton to his agent in New York with instructions to buy clothing and dry goods with the proceeds; the agent charges 2 $\frac{1}{2}$ % for selling and 2% for buying; what sum does the agent receive as commission?

20. My agent sold a consignment of wheat and invested the proceeds in sugar, deducting his commissions 4 $\frac{1}{2}$ % for selling and 2 $\frac{1}{2}$ % for buying; the sugar cost \$15,280; for what did the grain sell and what were the commissions?

21. I sold a consignment of machinery through an agent who charged me 1 $\frac{1}{2}$ % com.; I was allowed 8 $\frac{3}{4}$ % commission for sale and 2 $\frac{1}{4}$ % for guaranteeing payment, and I cleared \$140; what was my commission and the sum remitted to the consignor?

22. A merchant shipped 80 bbl. of flour to be sold at $\$6\frac{1}{4}$ a bbl., at 3% commission. After paying \$5.80 drayage he buys lime at \$18 a ton, com. $2\frac{1}{2}\%$; how much lime does he buy?

23. A real estate agent remitted \$9,081.68 net proceeds on the sale of a quarter section of land which sold at a profit of 20%, com. 2%; what was the cost price per acre?

24. A carload of potatoes were sold at a profit of 40% through an agent who received \$11.60 at 5% com.; at the same rate of commission what would have been the proceeds had they sold at a profit of 50%?

25. A merchant consigned grain to an agent who invested the proceeds of the sale in groceries, deducting his commissions, $1\frac{1}{2}\%$ for selling and $2\frac{1}{2}\%$ for buying; the groceries cost \$5765.85; what was the amount of the commissions?

26. The traveling man for a jobber received \$1000 a yr. and a certain rate of commission on the entire sales which made his salary \$1980; the goods which were sold at a profit of 25% cost \$89200; what rate of commission did the agent receive?

27. The entire cost of a horse and cow was \$160, the first cost of the horse being double the cost of the cow; the com. at 5% on the horse equaled the com. on the cow; what was the first cost of each?

28. A having \$8661.25 of B's money gets instructions to invest it in equal quantities of coffee and rice, com. $2\frac{1}{4}\%$; the coffee cost $12\frac{1}{2}$ ct. a lb. and the rice $8\frac{1}{4}$ ct. a lb.; how much of each were bought?

29. Which is the better and how much a salary of \$1600 or a commission of 20% of the net profits on the sale of \$80,000 worth of goods $\frac{2}{3}$ of which are sold at a profit of 24% and the other $\frac{1}{3}$ at a loss of $8\frac{1}{4}\%$, the 20% to be considered as expense?

TAXES.**29. Exercises and Problems in Taxes.**

1. Find the tax on \$10800 at 78 ct. on \$100.
2. Find the tax on \$1750 at $4\frac{1}{2}$ mills on \$1.
3. What is the tax on \$44500 at 87 ct. on \$100?
4. In a school district the real estate is valued at \$64000 and the personal property at \$18000. What rate of tax must be levied to build a school house at a cost of \$1025?
5. What is A's tax in the above district on 80 acres of land assessed at \$15 an acre, and personal property assessed at \$900?
6. What must be the tax rate on village property valued at \$600,000 to erect a school building at a cost of \$13280, allowing 2% for collecting?
7. If the state tax is 58 ct. on \$100, the county tax $3\frac{1}{2}$ mills on \$1, the city tax $3\frac{1}{2}$ ct. on \$1, how much will I pay on property valued at \$1500?
8. The equalized value of property in the city of Decatur for 1893 was \$3081060 and the total tax was \$107837.10; what was the tax rate?
9. My property is valued at \$1640 and my tax is \$111.40. What is the tax rate?
10. Required the rate of road and bridge tax on the property of a township assessed at \$425000, to build a bridge costing \$2500.
11. A town wishes to raise a tax of $17\frac{1}{2}$ mills on the dollar. There are 475 polls at \$2 each; the personal property is valued at \$125000, and the real estate at \$650,000. If the cost of collecting is $3\frac{1}{2}\%$, what will the net tax be? What is B's tax on real estate valued at \$2550 and personal property valued at \$790, he paying for 3 polls?
12. C pays \$15.56 $\frac{1}{2}$ more tax than A, their property being equal in value. The tax rate in their respective towns is \$3.65 and \$3.235 on \$100; what is the valuation?

13. In D. property is assessed at $\frac{1}{4}$ of its cash value, and the tax rate is $3\frac{1}{4}$ ct. on \$1; in E. it is assessed at $\frac{3}{8}$ of its value and the tax rate is 2 ct. on \$1; which city has the higher rate and how much?

14. What must be the tax rate to raise \$44825 to erect water works in a town when the real estate is valued at \$2275000 and the personal property at \$725000, the cost of collecting being $1\frac{1}{2}\%$?

15. How much income tax will a man pay whose income is \$12500 a year at 2% above \$4000?

16. J puts his income of \$9400 into the business on which he is taxed $4\frac{1}{2}$ mills on the dollar; what is the amount of his tax on this sum?

17. What is the income tax on a business of \$160000 of which 25% is profit, allowing 45% of the profits for running expenses and 5% of the profits for losses?

18. When the township tax is $.8\frac{1}{2}\%$, the county tax $.2\frac{1}{4}\%$, the school tax $.6\frac{1}{4}\%$, the valuation of A's property \$120000, and his whole tax is \$1927; what is the amount of his income?

19. The tax rate in a city is 1.4% on property valued at \$4540000; the collector received 2% on the first \$50000 and $1\frac{1}{2}\%$ on the remainder; he turned in \$58850; how much was delinquent?

20. A collector turned in \$14406 after deducting his commission of 2% and reporting 2% delinquent; what was the rate if the assessed valuation of property was \$1,000,000?

21. The total amount of taxes on the collector's books in Decatur township in 1895 is \$195000 at \$7.25 on \$100; what is the value of property the assessed valuation being $\frac{1}{4}$ of the actual value? What is the school tax in the township at \$2.18 on \$100? 24% of the total tax is delinquent; what is the collector's fee at 2% for collecting 90% of the delinquent tax?

INTEREST.**30. Problems in Interest.**

Required the interest of,

1. \$800 for 1 yr., at 5%; at 7%; at 9%.
2. \$450 for 8 yr., at 6%; at 8%; at 10%.
3. \$625 for 5 yr., at 7%; at 9%; at 10%.
4. \$685 for 6 yr., at $5\frac{1}{2}\%$; at $6\frac{1}{2}\%$; at $7\frac{1}{2}\%$.
5. \$884 for 4 yr., at $6\frac{1}{4}\%$; at $6\frac{3}{4}\%$; at $8\frac{1}{3}\%$.
6. \$1250 for 1 yr. 6 mo., at 6%; at 8%.
7. \$1750 for 3 yr. 8 mo., at 7%; at 9%.
8. \$2775 for 4 yr. 4 mo., at 5%; at 8%.
9. \$8825 for 3 yr. 9 mo., at 6%; at 9%.
10. \$1665 for 2 yr. 7 mo., at 5%; at 4%.

Find the interest on each of the above

11. At 6% for 1 yr. 8 mo. 15 da.
12. At 5% for 2 yr. 4 mo. 20 da.
13. At $4\frac{1}{2}\%$ for 4 yr. 7 mo. 18 da.
14. At 7% for 3 yr. 5 mo. 12 da.
15. At 10% for 3 yr. 5 mo. 15 da.

Find the amount of

16. \$750 for 4 yr. 3 mo. 17 da., at 8%.
17. \$27500 for 7 yr. 7 mo. 7 da., at $8\frac{1}{2}\%$.
18. \$8500 for 3 yr. 8 mo. 27 da., at $4\frac{1}{2}\%$.
19. \$1640 for 4 yr. 9 mo. 23 da., at 5%.
20. \$1175 for 7 yr. 4 mo. 20 da., at 7%.

Find the interest at 6, 7, and 9%

21. Of \$1250 from Jan. 1, 1890 to July 1, 1894.
22. Of \$1150 from June 1, 1893 to Sept. 15, 1895.
23. Of \$175 from Aug. 27, 1892 to July 13, 1893.
24. Of \$490 from April 25, 1890 to Aug. 15, 1895.
25. Of \$1475 from Sept. 20, 1894 to July 10, 1895.

26. Find the interest of \$2750 from Aug. 15, 1890, to May 25, 1898, at $4\frac{1}{2}\%$.
27. What is the interest on 15 thousand-dollar U. S. Bonds, at $8\frac{1}{2}\%$, from Jan. 1, 1890, to Oct. 1, 1898?
28. What is the amount of \$12500 from Apr. 15, 1890, to Sept. 15, 1894, at $7\frac{3}{4}\%$?
29. Find the amount of \$190 from Aug. 4, 1892, to Apr. 4, 1898, at $1\frac{1}{2}\%$ a mo.
30. Find the amount of \$400 from June 6, 1894, to the present time.

Exact Interest.

Find the exact interest,

31. Of \$850 from Mar. 1, 1890, to Sept. 15, 1890, at 7% .
32. Of \$1800 from Jan. 20, 1894, to Mar. 20, 1894, at 8% .
33. Of \$970 from July 1, 1890, to Sept. 16, 1890, at 7% .
34. Of \$4500 from Jan. 15, 1890, to Apr. 15, 1890, at $4\frac{1}{2}\%$.
35. Of \$295 for 2 mo. from Dec. 1, 1894, at 8%

Find the difference between the simple and the exact interest,

36. Of \$750 from April 5, 1890, to Sept. 15, 1891, at 6% .
37. Of \$1800 from Feb. 1, 1891, to Mar. 15, 1891, at 7% .
38. Of \$2550 from June 4, 1893, to Apr. 8, 1894, at 8% .
39. Of \$275 from June 16, 1894, to June 16, 1895, at 6% .
40. Of \$4550 for 90 days, at 7% .
41. Of \$4250 from Jan. 17, 1892, to Mar. 80, 1892, at 6% .

Miscellaneous Problems in Interest.

42. What principal will, in 8 yr., at 6%, amount to \$885?
43. On what principal will the interest for 2 yr. 6 mo., at 7%, be \$109.875?
44. What principal will in 8 mo. 28 da., at 6%, amount to \$1718.04?
45. On what principal will the interest for 7 yr. 7 mo. 24 da., at 6%, be \$844.25?
46. The time is 5 mo. 12 da., the rate $4\frac{1}{2}\%$ and the interest \$101.25. Find the principal.
47. A note dated Dec. 13, 1890, was paid Sept. 19, 1891, with 8% int. If the amount was \$10188.80, what was the face of the note?
48. If \$50.60 be paid for the use of a certain sum for 4 mo. 24 da., at 5%, what sum is loaned?
49. The interest of \$920, for 1 yr. 1 mo. 15 da. is \$72.45. Required the rate.
50. At what rate will \$1500 in 3 yr. 5 mo. 10 da. give \$282.50 interest?
51. The interest of \$2700 for 5 yr. 6 mo. 20 da. is \$987.50; what is the rate?
52. At what rate will \$1920 in 2 yr. 2 mo. 2 da. give \$208 $53\frac{1}{4}$ interest?
53. If the principal is \$106, the time 8 yr. 9 mo. 18 da., the int. \$69.96, what is the rate?
54. In 8 yr. 1 mo. 24 da., a note of \$960 amounts to \$1171.68. Required the rate.
55. The amount of a certain principal for 8 yr. 3 mo. at a certain rate is \$2119.6875, and for 7 yr. 9 mo. at the same rate \$2631.5625. Required the principal and rate.
56. In what time will \$3080, at 7%, give \$395.92 int.?
57. The interest of \$2880, at 5%, is \$826.40; what is the time?

58. In what time will \$212, at 6%, give \$56.498 int.?
 59. The interest of \$290, at 6% for a certain, time is \$58.725; what is the time?
 60. In what time will \$654, at 6%, amount to \$829.49?
 61. In what time will any principal double itself at 5%? at 6%? at 7%? at $12\frac{1}{2}\%$?
 62. In what time will \$750 treble itself at 5%? Quad-
 ruple itself at 6%?
 63. The amount of a certain principal for 4 yr. 5 mo. 10 da. is \$8296 and the amount of the same principal at the same rate for 6 yr. 8 mo. is \$8708. Required the principal and rate.

Interest Review

	Principal.	Rate.	Time.	Int.	Amt.
64.	\$720	7	3—6—0	—	—
65.	—	6	3—10—0	\$482.40	—
66.	\$1500	$4\frac{1}{2}$	10—0	—	—
67.	\$288	—	9—11—0	—	\$487.92
68.	\$106	$7\frac{1}{2}$	4—4—21	—	—
69.	—	6	3—6—0	—	\$756.55 $\frac{1}{4}$
70.	\$1875.75	8	—	\$500.20	—
71.	\$8200	—	2—8	\$88.60	—
72.	—	5	5—9—15	\$80.98	—
73.	—	—	1—2—27	\$114.78	\$1874.78
74.	—	6	1—9—10	—	\$1494
75.	\$121.50	7	4—5—21	—	—
76.	\$1081.50	$4\frac{1}{2}$	—	\$261.728	—
77.	\$750.	—	8—9—18	\$896.	—
78.	—	6	2—8—20	\$1270.24 $\frac{1}{3}$	—
79.	—	6	7—11	\$67.09	—
80.	\$1008.	$6\frac{1}{2}$	—	—	\$1089.90
81.	—	8	—7—24	\$67.60	—

Annual Interest.

82. The annual interest on \$4000 invested at 5% for 5 yr. remaining unpaid, what is the amount due?

83. At the end of 4 yr., what is due on a debt of \$800 with interest at 6% payable annually, if no payments are made till the end of the time?

84. What is the interest due on a note of \$950, at 6%, dated Oct. 30, 1890, int. payable annually, if no payments are made till June 30, 1894?

85. Find the amount due in 7 yr., on \$2800 at 7%, int. payable annually, the int. for the first 4 yr. having been paid when due.

86. The int. on a note of \$1200, payable in 5 yr., with annual int. at $4\frac{1}{2}\%$, has not been paid. What is the note worth at maturity?

Partial Payments.

87. \$994 $\frac{78}{100}$ Decatur, Ill., Mar. 15, 1891.

Three months after date we promise to pay Louis Chodat, or order, Nine Hundred Ninety-four $\frac{78}{100}$ Dollars, for value received, with interest at 6%.

Hamsher & Calhoun.

Indorsed as follows: Nov. 3, 1891, \$115; June 15, 1892, \$44.50; Aug. 1, 1892, \$250; Sept. 15, 1892, \$350. What is due Jan. 1, 1893?

88. A note for \$10500 was given Jan. 1, 1889. In-dorsements: May 8, 1890, \$600; Aug. 8, 1891, \$105; Sept. 9, 1892, \$180; Oct. 7, 1893, \$1425. What was due Jan. 1, 1894, int. 7%?

89. What is due July 16, 1894, on a note for \$1620, at 6%, dated Sept. 10, 1891, and bearing the following in-dorsements: Jan. 22, 1892, \$360; Mar. 1, 1893, \$75; Oct. 22, 1893, \$375?

90. A note of \$16800, with interest at 6%, is dated Jan. 11, 1891. Indorsed as follows: May 19, 1891, \$1500; Sept. 5, 1891, \$600; Jan. 1, 1892, \$900; April 17, 1892, \$450. What is due Jan. 11, 1893?

91. A note of \$7740, at 5% interest, is dated Oct. 9, 1888. Indorsements: Jan. 1, 1889, \$1000; June 11, 1889, \$1500; Oct. 9, 1889, \$2000; Jan. 1, 1890, \$500; April 10, 1890, \$50; June 9, 1890, \$500. What amt. is due Dec. 9, 1890?

92. Mercantile Rule (Count the days.)

A note was given for \$7500, April 1, 1893. Indorsements: June 11, \$600; July 5, \$300; Sept. 9, \$1350. What was due Oct. 1, 1893, int. 6%?

93. June 1, 1893, goods were purchased to the amount of \$3750, on which the following payments were made: Sept. 1, 1893, \$750; Oct. 4, 1893, \$900; Dec. 1, 1893, \$850; Jan. 8, 1894, \$620. What was due Jan. 30, 1894, int. 6%?

94. A note for \$1250 was given Jan. 1, 1893. Indorsements: March 10, 1893, \$180; June 1, 1893, \$250; Sept. 15, 1893, \$300; Nov. 20, 1893, \$125. What was due Jan. 1, 1894, at 7%?

Compound Interest.

95. Find the compound interest of \$800 for 6 yr. at 5%.

96. Find the compound interest of \$1500 from June 10, 1890, to Sept. 15, 1894, at 8%, payable semi-annually.

97. What is the amount at compound interest of \$900 for 16 yr., at 7%?

98. What is the difference between the simple and the compound interest of \$1500 for 16 yr. 6 mo. 6 da., at 6%?

99. Find the amount of \$1300 for 30 yr., at 6%, payable semi-annually.

100. What is the amount of \$600 for 12 yr., at 8%, payable quarterly?

DISCOUNT AND BANKING.

31. Problems in Discount and Banking.

The principal does not bear interest in these problems.
Find the present worth and discount.

	Principal	Time	Rate
1.	\$1150.	8 yr. 8 mo. 0 da.	8%.
2.	\$810.	1 — 4 — 0	6%.
3.	\$944.	2 — 3 — 0	8%.
4.	\$917.40	1 — 7 — 6	7%.
5.	\$1680.	1 — 4 — 0	9%.
6.	\$1900.	2 — 2 — 2	9%.
7.	\$125	60	10%.
8.	\$15000	1 — 11 — 15	6%.
9.	\$1196.80	4 — 20	10%.
10.	\$12600.	2 — 9 — 0	5%.

11. What is the present worth of \$420 due 2 yr. hence money being worth 6% ?

12. A note of \$2821.50, without interest, dated Nov. 16, 1882, is due May 1, 1887. What is its present worth, money being worth $6\frac{1}{2}\%$?

13. What sum in cash is equal in value to a note of \$684.82, due in 8 yr. 8 mo. 12 da., without interest, money being worth 6% ?

14. A debt of \$799.81 is due in 4 yr. 5 mo. 21 da. What will I gain by buying it for \$600, money worth 7% ?

15. Bought property for \$22000 cash; and sold it for \$7000 in cash, \$9000 due in 9 mo. and \$9000 due in 18 mo. What is the gain, money worth 8% ?

16. Which is better to buy flour at \$5.10 a bbl. cash, or at \$5.25 on 10 mo. time, money worth 6% ?

17. I am offered \$127.50 cash or \$182.50 in 9 mo. Which is the better and how much, money worth 8% ?

18. \$450 Pana, Ill., May 20, 1898.

Nine months after date I promise to pay Wm. Swim, or order, Four Hundred Fifty Dollars with interest at 7%.
Value received. E. S. Davis.

What is the present worth, June 30, 1898, discounted at 9%?

19. A note of \$700, with interest at 6%, is dated Jan. 15, 1894; due Nov. 15, 1894. What is the true discount June 1, 1894, at 8%?

20. I am offered \$8000 for my residence, or two notes, one for \$1200, due in 6 mo. bearing 6% int., and the other for \$1900, due in 9 mo., with 6% int. If money is worth 7% to me, which is the better offer and how much better?

Bank Discount.

Find the bank discount and proceeds of

21. \$400 for 60 days at 6%.
22. \$550 for 90 days at 7%.
23. \$725 for 30 days at 5%.
24. \$750.90 for 3 mo. at 6%.
25. \$3225 for 4 mo. at 8%.
26. \$595.80 for 6 mo. at $4\frac{1}{2}\%$.
27. \$2750 for 5 mo. at 5%.
28. \$1875.75 for 100 days at 9%.
29. \$10000 for 60 days at $6\frac{1}{2}\%$.
30. \$40 for 90 days at 7%.
31. For what sum must a note be given to yield \$125 when discounted at 6% for 60 days?
32. \$890 when discounted at 7% for 90 days?
33. \$500 when discounted at 10% for 30 days?
34. \$455.90 when discounted at 8% for 3 mo.?
35. \$1600 when discounted at 7% for 6 mo.?

Find date of maturity, discount, and proceeds of each of the following:

36. \$2100. Chicago, Ill., May 1, 1894.

Sixty days after date, for value received, I promise to pay D. A. Maffit, or order, Two Thousand One Hundred Dollars. Geo. P. Shepard.

Discounted May 4, 1894, at Union National Bank, at 7%.

37. \$665. Elgin, Ill., June 1, 1898.

Four months after date, for value received, I promise to pay John W. Cook, or order, Six Hundred Sixty-five Dollars, with interest at 7%. Wm. T. Harris.

Discounted Feb. 15, 1898, at 10%.

38. \$465.75 Indianapolis, Ind., Mar. 5, 1892.

Six months after date we promise to pay Jules Verne, or order, Four Hundred Sixty-five $\frac{75}{100}$ Dollars, at the First National Bank. Value received. Geo. P. Brown.

E. A. Gastman.

Discounted July 1, 1892, at 8%.

39. The bank discount of a 90-day note, at 6%, is \$186; what are the proceeds?

40. The bank discount of a 60-day note, at 6%, is \$15.75; what is the face?

41. What is the face of a note, at 80 days, the proceeds of which when discounted at a bank at 7%, are \$2850?

42. The proceeds of a 90-day note, when discounted at $7\frac{1}{2}\%$, were \$630.46; what was the face of the note?

43. A two month note of \$1800, with interest at 5% is dated Feb. 5, 1894, and discounted at the Citizens' National Bank Feb. 21, at 7%. Find date of maturity, the term of discount, and proceeds.

44. Bought a lot for \$550 April 15, 1894, but having only \$250 cash, I discounted my note at a bank for 8 mo. at 7%, to realize the balance; when must I meet my obligation, and how much must I pay?

45. What is the difference between the present worth and the proceeds of \$890 due in 9 mo., at 6%?

46. The proceeds of a note for \$1200, discounted at 6%, were \$1181.40; what was the time?

47. A note dated Feb. 1, 1894, was discounted Mar. 15, 1894, at 6%; the face of the note was \$240 and the discount \$1.80; how long did it run after it was discounted?

48. A note dated Mar. 18, 1894, at 8 mo., was discounted at the Farmers' Bank, at 7%; the face of the note was \$720, and the proceeds \$715.10; when was it discounted?

49. A broker bought a 90-day note for \$21.70 less than the face; what was the face, discount 7%?

50. A note for \$11250 dated May 27, 1894, payable in 8 mo., with interest at 7%, was discounted May 27, 1894, at 8%. Required the term of discount, and proceeds.

51. The difference between the true and the bank discount at 6% on a sum of money due in 1 yr. 6 mo., is \$8.645; what is the sum of money?

52. A man was offered \$2500 cash for his town property, or three notes as follows: \$500 due in 6 mo.; \$900 in 12 mo., and \$1200 in 18 mo. How much does he gain or lose by accepting the latter and discounting the notes at 7%?

53. A Montana merchant having bought a bill of goods amounting to \$2400 on 90 days' time, was offered 5% and 5% off for cash. He borrowed the money at 10% and paid the bill; what did he gain by so doing?

54. A holds a note of \$10000 due in 6 mo. which he wishes to cash. A banker offers to discount it at 6%, and a neighbor offers to take it at $6\frac{1}{2}$ % discount. Which is the better offer, and how much?

55. The bank discount, at 6% for 1 yr., without days of grace, is \$1.98 more than the true discount of a note at the same rate. What is the true present worth of the note?

INSURANCE.**32. Problems in Insurance.**

1. What is the cost of insuring a house valued at \$950 at $1\frac{1}{2}\%$ premium?
2. What will it cost to insure an opera-house worth \$90000 at $2\frac{3}{8}\%$ on $\frac{3}{4}$ of its value?
3. The cost of insuring a house worth \$2400 for $\frac{3}{4}$ of its value and a barn worth \$1260 for $\frac{3}{8}$ of its value for 5 yr. is \$46.20. What is the rate of insurance?
4. A man paid \$51.75 to insure a house for $\frac{3}{8}$ of its value at $2\frac{1}{4}\%$; what was the value of the house?
5. Heuver & Gliddon's shoe factory valued at \$100,000 is insured at $1\frac{3}{4}\%$ for 5 yr. on $\frac{3}{4}$ of its value. What would be their loss if the factory should be destroyed by fire?
6. A merchant insured his store for $\frac{3}{4}$ of its value at $1\frac{3}{8}\%$, but soon after the store was burned down, and his loss over the insurance was \$5831; what was the value of the store?
7. How much is a district benefited by insuring a school building worth \$86000 at $1\frac{1}{2}\%$ if the building is burned and $\frac{3}{8}$ of the insurance paid?
8. What is the premium on a vessel worth \$15000 at $2\frac{1}{4}\%$ and a cargo worth \$24000 at $1\frac{1}{8}\%$?
9. An insurance company took a risk of \$125000 at $\frac{1}{8}\%$, reinsuring $\frac{3}{8}$ of it with another company at $\frac{3}{4}\%$ and $\frac{1}{4}$ of the remainder with an other at $1\frac{1}{4}\%$; what did the company lose by reinsuring?
10. A company insured a block of buildings for \$400000 at $\frac{3}{4}\%$; but thinking the risk too great they reinsured \$120000 of it at $\frac{3}{8}\%$ with another company, and \$200000 of it at $\frac{5}{8}\%$ with another. What is the loss of the company first taking the risk should a \$250000 loss occur?

11. If I pay \$36 for insuring my house worth \$6000 at the rate of 90 ct. on \$100, what part of the house is insured?

12. A house is insured for $\frac{3}{4}$ of its value at the rate of 40 ct. on the hundred dollars, and the premium is \$21.60; what is the value of the house?

13. Goods worth \$27090 were shipped from Boston to Liverpool. For what sum must they be insured, at $8\frac{1}{4}\%$, to cover both property and premium?

14. A cargo of fruit cost \$36781.875. For what must it be insured, at $2\frac{1}{2}\%$, to cover both cost and premium?

15. I took a risk at 2%; reinsured \$25000 at $2\frac{1}{4}\%$, and \$10000 at $1\frac{3}{4}\%$; my share of the premium was \$762.50. What sum was first insured?

16. An insurance company took a risk of \$32000, at $\frac{3}{4}\%$, reinsured $\frac{1}{2}$ of it at $\frac{5}{8}\%$, and $\frac{3}{8}$ of it $\frac{1}{16}\%$; what did the company clear on the part reinsured?

17. A merchant insured his building and stock of goods at 2% on $\frac{2}{3}$ of their value, the goods being worth a half more than the building; a fire caused a loss of half the building and stock by which the owner lost, including premium, \$2250; what was the value of each?

18. The Aetna Insurance Co. took a risk on $\frac{2}{3}$ of the value of a business block, at $1\frac{1}{2}\%$, reinsured $\frac{1}{4}$ of the risk in the Home, at $1\frac{3}{4}\%$. The property was destroyed, and the Aetna lost \$98750 more than the Home. What did the owners of the property lose?

19. A. J. Wallace, wholesale stationer, had \$18500 insurance on his stock of goods and machinery, divided among ten companies, as follows: \$2500, \$2000, \$1500, \$1500, and the other six companies \$1000 each. The stock was damaged to the amount of \$5000. How much should each company pay?

STOCKS AND BONDS.**33 Problems in Stocks and Bonds.**

1. What is the cost of 600 shares C. B. & Q. stock at $81\frac{3}{8}$?
2. What must I pay for 180 shares of mining stock at $115\frac{3}{8}$?
3. When Gen. Elec. stock is selling at $79\frac{1}{2}$, how much can I buy for \$87450?
4. What cost 40 shares Adams Express Co. stock at 155, brokerage $\frac{1}{8}\%$?
5. Find the cost of 65 shares Lake Shore R. R. stock at $127\frac{1}{8}$; brokerage $\frac{1}{8}\%$.
6. How many shares St. L. Ex. stock bought at $119\frac{3}{8}$ and sold at $120\frac{3}{8}$, brokerage $\frac{1}{8}\%$ each way, will produce a gain of \$570?
7. When Mich. Central is quoted at $1\frac{1}{2}\%$ discount, how many shares can be bought for \$7890, brokerage $\frac{1}{8}\%$?
8. What is my annual income on an investment of \$70575 in U. S. 4's, at $117\frac{3}{8}$?
9. I receive \$558 as my share of a $4\frac{1}{2}\%$ dividend; how many shares at \$50 do I own?
10. A company whose stock is \$62500 requires an assessment of \$987 $\frac{1}{2}$; what is the rate?
11. What per cent. will U. S. 4's of 1907 at $112\frac{3}{8}$ pay on the investment, brokerage $\frac{1}{8}\%$?
12. At $110\frac{1}{2}$, what sum must be invested in currency 6's, brokerage $\frac{1}{8}\%$, to yield an annual income of \$900?
13. At what rate must 4% bonds be bought to yield 5% on the investment? 6%?
14. A capitalist has \$5997.20 invested in C. C. C. & I. stock at 47. If a $4\frac{1}{8}\%$ dividend is declared, what is his income?

15. Which is the better and how much, to invest \$53375 in Adams Express stock at $152\frac{3}{8}$ and paying a dividend of 9%, or in W. U. Telegraph stock at $87\frac{3}{8}$ and paying a dividend of 5%, brokerage $\frac{1}{8}\%$ in each case?

16. Mr. W. sells 440 shares stock paying 4%, at 80 and loans the proceeds at 7%; how much is his income increased?

17. A dealer invested \$18048.75 in N. Y. Central stock at $89\frac{1}{4}$, brokerage $\frac{1}{8}\%$ and received an income of \$1095; what rate of dividend was declared?

18. My broker sells for me 125 shares stock at 127, brokerage $\frac{1}{4}\%$, and buys 87 shares at 95, brokerage $\frac{1}{8}\%$, remitting the balance; how much is remitted?

19. Which is the better and how much, 6% bonds at 150, or $4\frac{1}{2}$'s at $118\frac{1}{2}$?

20. If bonds bought at $16\frac{3}{8}\%$ discount pay 5% on the investment annually, what rate of interest do they bear?

21. If I invest \$10560 in stock at 182, semi-annual dividend 5%, what will be my annual income?

22. A speculator bought stock at $88\frac{3}{4}$, and after receiving a half year's dividend of 6%, he sold out at $95\frac{5}{8}$, and made a profit of \$721; how much stock did he buy?

23. How much must be given for 14 shares stock, paying an annual dividend of 10%, to make 9% on the investment?

24. A lady bought 5-20's, int. 6%, at $115\frac{3}{4}$ to the amount of \$1889 and sold at $117\frac{5}{8}$; what profit did she make?

25. A person holding 94 shares R. R. stock, sells at $92\frac{7}{8}$ and invests the proceeds in mining stock at $75\frac{5}{8}$; how many shares does he buy and how much money has he left?

26. If I buy C. R. I. & P. R. R. stock at $67\frac{1}{4}$ and sell at 79, brokerage $\frac{1}{8}\%$ each way, what do I make on 125 shares?

27. A capitalist invested \$5520 in stock at 115. The company declared a dividend of 9%; what was his share of the dividend?

28. If $4\frac{1}{2}\%$ bonds yield annually 5% of their cost, what is the rate of discount?

29. The income from my store at 6% of its value was \$1245. The store was sold at a cost of \$250 and the proceeds given to a broker who invested in C. & N. W. stock at $102\frac{1}{4}$, brokerage $\frac{1}{4}\%$; my income being doubled, what rate of dividend was declared?

30. What sum must be invested in currency 6's of 1899 at $115\frac{2}{3}$, brokerage $\frac{1}{8}\%$, to yield an annual income of \$750?

31. A man bought 60 shares Diamond Match stock at $126\frac{1}{8}$, brokerage $\frac{1}{8}\%$; if the dividend declared is $7\frac{1}{2}\%$, what rate does he make on his investment?

32. A teacher has \$11560 to invest. He can buy C. B. & Q. stock at $84\frac{1}{8}$ or C. & A. at $144\frac{3}{8}$, brokerage $\frac{1}{8}\%$ in each case; if the former road pays a dividend of $4\frac{1}{2}\%$ and the latter 8%, which will be the better investment and how much?

33. At what rate must U. S. 5's be bought to pay $5\frac{5}{8}\%$ on the investment?

34. A banker has an investment in Pullman Palace Car stock which pays $5\frac{5}{7}\%$ when the dividend declared is 9%; at what premium did he buy the stock?

35. A lady invests in Manhattan stock at $115\frac{1}{2}$, and Am. Ex. at $110\frac{1}{4}$, the dividends being on the former $7\frac{1}{2}\%$, and on the latter 6%. Her income from each is \$900. What sum has she invested in each kind of stock and what % does she receive on her whole investment?

36. What has been the rate % of income on 5% bonds, bought at 15% premium 20 yr. ago, if the bonds are paid at par to-day?

EXCHANGE.**34. Exercises and Problems in Exchange.**

Find the cost of a draft for

- | | |
|---------------------------------------|--|
| 1. \$600, premium $\frac{1}{2}\%$. | 7. \$447.70, premium $\frac{1}{4}\%$. |
| 2. \$960, discount $\frac{3}{8}\%$. | 8. \$4776, discount $\frac{1}{8}\%$. |
| 3. \$1890, premium $\frac{1}{4}\%$. | 9. \$17625, premium $\frac{1}{4}\%$. |
| 4. \$9460, premium $\frac{1}{8}\%$. | 10. \$8762.50, premium $\frac{1}{8}\%$. |
| 5. \$4490, discount $\frac{5}{8}\%$. | 11. \$2400, premium \$1.75. |
| 6. \$3780, discount $\frac{1}{8}\%$. | 12. \$8360, discount \$1.50. |

Find the face of a draft costing

- | | |
|---|---------------------------------|
| 13. \$5006.25, premium $\frac{1}{8}\%$. | 18. \$4899.84, discount .015%. |
| 14. \$4859.59, discount $\frac{3}{8}\%$. | 19. \$3480.87, premium .025%. |
| 15. \$8426.52, premium $\frac{1}{8}\%$. | 20. \$9920.74, premium \$2 50. |
| 16. \$9921.86, premium $\frac{1}{2}\%$. | 21. \$2820.47, discount \$1.25. |
| 17. \$5270.79, discount $\frac{1}{4}\%$. | 22. \$8898.70, discount \$.75. |

Note.—When exchange is quoted at a given sum it means so much on \$1000. \$1.50 on \$1000 = $\frac{3}{20}\%$.

Find the cost of

23. A 60-day draft for \$4500, $\frac{3}{8}\%$ premium, int. 7%.
24. A 90-day draft for \$1200, $\frac{1}{2}\%$ dis., int. 9%.
25. A 45-day draft for \$1780, $\frac{1}{8}\%$ prem., int. 6%.
26. A 30-day draft for \$1860, $\frac{3}{4}\%$ dis., int. 6%.
27. What is the cost in Chicago of a draft on New Orleans for \$2187, at $\frac{3}{8}\%$ premium?
28. Find the cost in Springfield of a draft on New York for \$1580, at $\frac{1}{4}\%$ premium.
29. Find the cost of a draft on Chicago for \$400 payable 80 days after sight, at 6%; exchange $2\frac{1}{2}\%$ premium.
30. What is the cost of a 60-day draft in New York for \$2700, exchange being $\frac{3}{8}\%$ discount?
31. What must I pay for a draft on St. Louis, at 80 days, for \$1650, exchange $\frac{1}{2}\%$ premium and interest 6%?

32. I owe a Chicago house \$1760. What will be the cost of a draft to pay the bill, at $\frac{5}{8}\%$ premium?

33. I paid \$2500 for a draft on Philadelphia at $\frac{5}{8}\%$ premium; how large a draft did I buy?

34. I have \$2422.80 belonging to a New York house with which they request me to buy a 60-day draft, premium 2%, interest 6%; what will be the face of the draft?

35. D of Spokane owes A of Baltimore \$27950.25 and sends him a check for that amount; but A is obliged to allow a discount of $\frac{1}{4}\%$ to cash the check. How much does D still owe A, and for what sum should the check have been drawn to pay the debt?

36. A merchant in Omaha pays \$2150 in Chicago by a 80-day draft. What does the draft cost, exchange $\frac{1}{2}\%$ premium and int. 6%?

37. When exchange is $\frac{1}{4}\%$ premium and interest 6%, what is the cost of a draft on Chicago for \$8600, payable 60 days after date?

38. A merchant in Memphis paid \$8460.82 for a draft of \$8456; what was the rate of exchange?

Foreign Exchange.

39. Find the cost of a bill of exchange on Liverpool at 8 days' sight for £1760 16s., when exchange is quoted at \$4.87.

40. What is the cost of a bill on Paris for 8885 francs, when \$1 = 5.15 francs?

41. Find the cost of a bill on Amsterdam for 8780 guilders, quoted at \$.41 $\frac{1}{4}$, brokerage $\frac{1}{2}\%$.

42. What is the cost of a draft on St. Petersburg for 4500 roubles, the value of a rouble being \$.601?

43. A bill on London cost \$3178.22; what is the face, exchange being \$4.88?

44. The value of a franc is \$.198; if a bill on Paris cost \$1412.0652 when exchange is at $\frac{1}{2}\%$ premium, what is its face in francs?

45. A draft on Vienna cost \$887.50 when 1 florin=45 cts.; what is the face in florins?

46. What are the proceeds of a draft on Paris for 18680 francs at 5.19 $\frac{1}{2}$, brokerage $\frac{1}{2}\%$?

47. A draft on Paris at 5.15 cost \$1750; what was its face?

48. The cost of a bill on Amsterdam at 41 $\frac{1}{2}$ ct., brokerage $\frac{1}{2}\%$, is \$2001.96; what is the face?

49. A merchant sent a messenger with a bill of exchange of 82000 francs to two bankers, with instructions to sell to the best advantage. One offered to buy the bill at 5.27 and the other at 5.27 $\frac{1}{2}$. Which was the better offer, and how much?

50. How much must I pay in New York for a sight bill of exchange at \$4.88 $\frac{1}{2}$, to pay for goods bought in London amounting to £1811 17s. 6d., less 4%?

51. What cost \$50,000,000 in U. S. bonds of 1895, in London at 108, exchange \$4.875=£1?

52. M, preparing to travel, deposits Jan. 2, 1895, \$600 with the Citizens' National Bank, for which he is allowed 8% int., and obtains a letter of credit; he draws Mar. 10, \$100; April 21, \$120; June 2, \$100; July 2, \$150; what is due him at settlement Sept. 10, 1895?

53. P, before taking a trip to Europe, deposits Apr. 20th, \$1000 with Morgan, Drexel & Co., New York, for which he receives 8 % int., and obtains from them a letter of credit on May 10 he draws £150 in London, the bill of exchange at sight reaching New York, May 20; what is the balance due him Aug. 1, com. of M. D. & C. 1 %, exchange, \$4.875=£1?

DUTIES.**35. Problems in Custom-House Business.**

1. What is the duty at \$1 per doz. and 40% ad valorem, on 20 cases of hose each containing 6 gross valued at \$2.50 per doz.?

2. What is the tariff on 80 gross pocket knives invoiced at \$4.50 per doz., duty \$2 per doz. and 50% ad valorem, and 20 gross razors invoiced at \$7 per doz., duty \$1.75 per doz. and 80% ad valorem?

3. What is the duty, at 8c. per sq. yd. and 50% ad valorem, on 10 cases of dress goods each case containing 80 pieces of 40 yd. each, $\frac{3}{4}$ yd. wide and valued at 16c. per yd.?

4. What is the duty on 12000 cigars, weighing 150 lb., invoiced at \$7.50 per C, duty \$4.50 per lb. and 25% ad valorem?

5. A liquor dealer imports 450 doz. pt. bottles champagne invoiced at \$3.75 per doz.; if 6% of the bottles are broken, what is the duty at \$5 per doz.?

6. Bradley Bros. imported 8 cases silks, each containing 1950 yd.; what was the invoice price per yd. if the duty at 50% was \$2840?

7. Will L. Thompson, E. Liverpool, O., imported the following musical instruments: 46 pianos invoiced at \$195 each; 24 organs at \$65 each; 15 guitars at \$15 each; 12 violins at \$8 each; if the duty is \$1960.40, what is the rate?

8. What is the cost in Chicago of a case of watches invoiced at 14250 francs imported from Geneva, Switzerland, duty 25%, charges 27 francs, commissions $2\frac{1}{2}\%$?

9. What is the duty on fur hats valued at \$3750, and silks valued at \$3390, duty on the former 55%, and on the latter 50% ad valorem?

10. Find the duty, at 44 ct. per sq. yd. and 40% ad valorem on 3672 yd. Brussels carpet invoiced at 50 ct. a yd.

11. Find the duty on 3220 yd. treble ingrain carpet, valued at 40 ct. per yd., duty 19 ct. per sq. yd.; 1760 yd. double ingrain carpet, valued at 36 ct. per yd., duty 14 ct. per sq. yd.; and 40% ad valorem on each.

12. What is the duty at 2½c. a lb. on 450 packs unwashed wool, each pack containing 240 lb., tare 5%?

13. A merchant imports 2800 suits woolen clothing, invoiced at \$8.50 and weighing 3½ lb. each; 720 doz. pairs woolen blankets, invoiced at \$3 and weighing 4½ lb. per pair; what is the duty at 50ct. per lb. and 35% ad valorem?

14. Marshall Field & Co. import from Lyons 8800 yd. silk, invoiced at 9780 francs; freight \$28.31, com. 1½%, and duty 50%; at what price must they sell to make 25% profit on the entire cost?

15. What is the duty in currency at \$4.50 per lb. and 25% ad valorem, on 250 boxes Havana cigars, 100 in each box, weighing 12 lb. per M and costing \$80 per M, gold being worth 107¾?

16. What is the duty at 50 ct. per lb. and 35% ad valorem on a bill of goods invoiced at £985 8s., and weighing 1548 lb.?

17. Find the whole duty on the following imports: 2 cases woolen dress goods 25 pcs. of 50 yd. each, at 50 ct. per yd., duty 50%; 3 cases cotton dress goods 80 pcs. of 54 yd. each, at 20 ct. per yd., duty 25%; 1 case table linen 80 pcs. of 44 yd. each, at 37½ ct. per yd., duty 35%; 1 case of 250 doz. linen towels, at \$1.50 per doz., duty 35%.

18. A grocer imports 760 bags of coffee, gross weight 160 lb. each, tare 5%, invoiced at 11 ct. a pound; what is the duty at 18%?

Note.—In reckoning duties, whole dollars, pounds, gallons, etc., are used as the base, fractions less than ½ being rejected and more than ½ being reckoned as 1. Duties are payable in gold.

(Dr. Brooks.)

RATIO AND PROPORTION.

36. Problems in Ratio and Proportion.

What is the value of

1. 82 : 8?
2. 8 : 82?
3. \$25 : \$25?
4. 48 lb. : 16 lb.?
5. $\frac{7}{8}$: $\frac{7}{16}$?
6. 6.25 : 1.25?
7. 12.5 : 62.5?
8. $4\frac{3}{4}$: $1\frac{3}{4}$?
9. 24 ft. : 6 in.?
10. 7.5 : 75?
11. 1 bu. : 1 qt.?
12. 7 yd. : $10\frac{1}{2}$ in.?
13. 8 qt. : 8 bu.?
14. 24 gal. : 8 qt.?
15. 6 yd. 4 in. : 8 yd. 1 ft. 1 in.?
16. 4 lb. 8 oz. : 9 lb.?
17. 1 ton 1 cwt. : 75 lb.?
18. Antecedent 188; consequent 19; find ratio.
19. Antecedent 532; ratio 14; find consequent.
20. Antecedent 17 A. 120 P.; con. 4 A. 70 P.; find ratio.
21. Consequent 8 T. 7 cwt.; ratio 16; find antecedent.
22. $\left\{ \begin{array}{l} 4\frac{1}{2} : 2\frac{1}{4} \\ 16 : 5\frac{1}{3} \end{array} \right\} = ?$
23. $\left\{ \begin{array}{l} 17\frac{1}{2} : 35 \\ ? : 1\frac{3}{8} \end{array} \right\} = 24.$
24. The ratio is 1; the antecedents are 4 and $\frac{1}{2}$; one of the consequents is 5; what is the other?
25. The consequents are 5 and $8\frac{1}{3}$; one of the antecedents $8\frac{1}{2}$; the ratio $1\frac{3}{4}$; find the other antecedent.

Analysis.

The following list of problems should be solved first by analysis, then by proportion.

1. If 8 hats cost \$2.70, what cost 7 hats?
2. What is the value of $\frac{5}{8}$ of an acre of land at \$48 for $\frac{3}{4}$ of an acre?
3. If 5 men load a car in 7 hr., in what time will 4 men load it?

4. Find the cost of 60 rd. of brick walk 48 in. wide at \$72 for 80 rd. 40 in. wide.

Analysis—

- (1) $8 = \$2.70$ | Read.—Since the cost of 8 hats equals \$2.70,
 $1 = \$.90$ | the cost of 1 hat equals \$.90, and the cost
 $7 = \$6.80$ | of 7 hats equals \$6.80.

By proportion.—The cost of 7 hats is to the cost of 8 hats as 7 hats is to 8 hats; or $x : \$2.70 :: 7 : 8$.

Analysis—

- (2) $\frac{3}{4} = \$48$. | Read.—Since $\frac{3}{4}$ of an acre is worth \$48, $\frac{1}{4}$ of
 $\frac{1}{4} = \$16$. | an acre is worth $\frac{1}{4}$ of \$48 which is \$16, and
 $1 = \$64$. | $\frac{4}{4}$, or 1 acre, is worth 4 times \$16 which is
 $\frac{1}{8} = \$8$. | \$64. If 1 acre cost \$64, $\frac{1}{8}$ of an acre will
 $\frac{5}{8} = \$40$. | cost $\frac{1}{8}$ of \$64 which is \$8, and $\frac{5}{8}$ of an acre

will cost 5 times \$8 which is \$40.

By proportion.—The value of $\frac{5}{8}$ acre is to the value of $\frac{3}{4}$ acre as $\frac{5}{8}$ is to $\frac{3}{4}$ or, $x : \$48 :: \frac{5}{8} : \frac{3}{4}$.

Analysis—

- (3) $5 = 7$ | Read.—If 5 men load a car in 7 hr. it will take
 $1 = 35$ | 1 man 5 times 7 hr. which is 35 hr., and it
 $4 = 8\frac{3}{4}$ | will take 4 men $\frac{1}{4}$ of 35 hr. which is $8\frac{3}{4}$ hr.

By proportion.—The time it will take 4 men to load a car is to the time it will take 5 men inversely as 4 men is to 5 men, or as 5 men is to 4 men, or $x : 7 \text{ hr.} :: 5 \text{ m.} : 4 \text{ m.}$

Solution.—(4) If a walk 80 rd. long cost \$72, a walk 1 rd. long will cost $\frac{1}{80}$ of \$72 which is \$2.40, and a walk 60 rd. long will cost 60 times \$2.40 which is \$144; since a walk 40 in. wide cost \$144, a walk 1 in. wide will cost $\frac{1}{40}$ of \$144 which is \$3.60, and a walk 48 in. wide will cost 48 times \$3.60 which is \$172.80.

Straight line analysis—	\$	rd.	in.
$\frac{\$72 \times 60 \times 48}{80 \times 40} = \$172.80$	72	80	40
	x	60	48

LEACHERS' LIBRARY
No. 11444

By proportion.—The cost of a walk 60 rd. long is to the cost of a walk 80 rd. long as 60 rd. is to 80 rd., and as 48 in. is to 40 in.; or, $x : \$72 :: \begin{cases} 60 : 80 \\ 48 : 40 \end{cases}$

Note.—Analysis may be made easier for the beginner by placing the numbers in pairs, as above, to the right.

Simple Proportion.

26. If 6 hats cost \$18, what will 11 hats cost?
27. If 8 oranges cost 13 ct., what will 12 oranges cost?
28. If 8 sheep are worth \$29, what are 20 sheep worth?
29. Five bbl. of sirup cost \$120; how much will 8 bbl. cost?
30. If 4 bu. of potatoes cost \$7, what will 20 bu. cost?
31. If a man earn \$54 in 8 mo., how much can he earn in 10 mo.? In $\frac{3}{4}$ of 15 mo.?
32. What cost 21 bbl. cranberries, if 7 bbl. cost \$17?
33. If 10 horses eat 16 bales of hay in a week how many bales will 25 horses eat in same time?
34. If a tree 27 ft. high casts a shadow 45 ft., how high is a tree that casts a shadow 135 ft.?
35. At the rate of 6 horses for \$960, what cost 11 horses?
36. What cost 89 lb. ginseng, if 19 lb. cost \$7.08?
37. If 24 bu. of wheat cost \$15.60, what will 50 bu. cost?
38. What is the weight of 78 bu. of wheat, if 12 bu. weigh 726 lb.?
39. If a clerk's expenses for 22 days, are \$87.40, what are his expenses for a common yr.?
40. If a train travel 220 mi. in 8 hr., how far will it travel in 6 hr. 80 min.?
41. If $6\frac{1}{2}$ cords of wood cost \$14.8 how much can be bought for \$257.40?
42. Find the cost of 20 car loads of 8 tons 6 cwt. of coal at the rate of 18 tons for \$85.50.

-
43. If 720 qt. of milk produce 96 lb. of butter, how much milk will be required to produce 50 lb.?
44. How long will it require 10 men to mow 25 acres, if they mow 8 acres in 6 days?
45. How many men are required to build a house in 10 days, which takes 6 men 80 days?
46. If 40 yd. of carpet $\frac{3}{4}$ yd. wide cover a floor, how many yd. $\frac{7}{8}$ yd. wide will it take?
47. If a farm of 90 acres rent for \$382.50, what should be the rent for a section of land?
48. If a grocer use a weight deficient $\frac{1}{2}$ oz. to the lb., how much does he gain on a bbl. of sugar of 341 lb., sold at 22 lb. for \$1?
49. If a tax of 9 mills on the dollar raise \$28090, what must be the rate to raise \$28140?
50. What is gained on a bbl. of coal oil of 51 gal. at 15 ct. a gal., if the retailer uses a half gallon measure which is dented so as to be 1 gill short?

Compound Proportion.

51. If 8 men in 12 da. earn \$512, how much will 24 men earn in 26 da.?
52. How much can 3 men earn in 10 da. of 8 hr. each, if 5 men in 12 da. of 10 hr. each earn \$240?
53. What is the weight of a piece of granite 10 ft. long, 60 in. wide, 2 ft. thick, if a piece $4\frac{1}{2}$ ft. long, 2 ft. wide and 18 in. thick weighs 3240 lb.?
54. If 8 men dig a tile ditch 2 mi. long, 4 ft. deep in 10 days, how long will it take 6 men to dig $3\frac{1}{2}$ mi. 6 ft. deep?
55. It costs 3 families of 5 persons each \$405 for 6 weeks' board; how much will it cost 2 families of 7 persons each for 8 weeks?
56. If 18 persons eat \$48 worth of bread in 4 mo. when flour is \$6 a bbl., what is the value of the bread consumed

by a family of 8 persons in a yr., when flour is \$9 a bbl., if 2 of the family are away every other week?

57. If 10 compositors in 12 da. of 6 hr. each compose 24 sheets of 86 pp., 40 lines to the p., and 48 letters to the line, in how many days of 8 hr. each can 15 compositors compose a quarto volume of 400 sheets, of 8 pp. to the sheet, 192 lines to the p. and 36 letters to the line?

58. If the cost of carpeting a room with ingrain carpet a yd. wide, at \$1.20 a yd. is \$45; what will it cost to carpet the same room with Brussels $\frac{3}{4}$ yd. wide, at \$1.75 a yd.?

59. If it cost \$80 to carpet a room 18 ft. long and 16 ft. wide, how much will it cost to carpet a room 12 ft. by 15 ft., with carpet costing one-third more on the yd.?

60. The cost of excavating a basement 40 ft. long, 80 ft. wide, and 7 ft. deep, is \$56; what will it cost to excavate a basement 150 ft. long, 80 ft. wide, and 8 ft. deep?

61. If 85 horses eat 180 bu. of grain in 18 da., in what time will they eat 4 times as much if 5 horses are added when the grain is $\frac{2}{3}$ eaten?

62. A farmer finds that a herd of 128 hogs eat 196 bu. of corn in a wk. He had 5880 bu.; when it was half eaten he sold $\frac{1}{4}$ of his hogs; how many weeks did the corn last?

63. If the cost of plastering the walls of a room 80 ft. long, 48 ft. wide, and 16 ft. high is \$81.92, what will be the cost of plastering the walls of a room 72 ft. long, 80 ft. wide, and 15 ft. high?

64. If 8 men can dig a ditch 20 rd. long, 8 ft. wide, 2 $\frac{1}{2}$ ft. deep, in 10 da. of 12 hr. each, in how many da. of 10 hr. each can a ditch 30 rd. long, 8 $\frac{1}{2}$ ft. wide, 3 ft. deep, be dug by 10 men if 4 of them quit when $\frac{1}{4}$ of the job is done?

65. What is the time required for the construction of a district ditch 8 mi. long, if 16 men in 6 weeks, working 8 hr. a day, for 5 da. each wk., dig 240 rd. 4 yd. wide and 10 ft. deep, when 8 men are added and all work 10 hr. a day, and 6 da. each wk.?

Partitive Proportion.

66. At an election 9821 votes were cast; M received 487 more than H, and H received 2995 more than C; how many votes did each receive?

67. Three men rent a pasture for \$68 for 4 mo. S puts in 4 cows, J 8 cows, and B 5 cows; what sum should each pay?

68. Three men buy a rick of hay for \$105.75. The sums they pay are to each other as 8, 5, and 7; what does each pay?

69. The sum of two numbers is 2520; they are to each other as $6\frac{1}{2}$ to 11; what are the numbers?

70. Three men perform a job of work for \$1584.50. A works 12 men 20 da., B 10 men 25 da., and C 8 men 24; what was the profit of each if the average daily wages was \$1.60?

71. Divide 475 into three parts which are to each other as 9, 27, and 89.

72. Divide \$96 among three persons in the ratio of $\frac{1}{3}$, $\frac{2}{3}$, and $\frac{4}{3}$.

73. Paid \$1008 for 9 horses, 4 cows and 24 sheep; a cow cost 3 times as much as a sheep, and a horse 4 times as much as a cow; what was the price of each?

74. Divide \$39440 in the proportion of $\frac{1}{3}$, $\frac{2}{3}$, and $\frac{4}{3}$, and it will give respectively $2\frac{1}{2}$ times A's, $1\frac{1}{2}$ times B's, and $8\frac{2}{3}$ times C's money; how much has each?

75. Mr. C is worth \$7050 more than H, and they are worth together \$89478; how much is each worth?

76. A speculator bought 3 farms; the first cost \$700 more than the second, and the third cost \$1000 less than the second; all cost \$14100; what did each cost?

77. The cost of 3 houses was \$21600. What was the cost of each, if the first cost \$1200 more than the second, and the third \$2400 less than the first?

78. L, M, and O have \$10855; L has 8 times as much as M and 4 times as much as O; how much has each?

79. Two men lay 18500 brick; the first lays $\frac{1}{4}$ more than the second; how many does each lay?

80. D and E have 6765 bu. of corn; $\frac{3}{4}$ of D's equals $\frac{4}{5}$ of E's; how many bu. has each?

81. The difference between two numbers is 210, and $\frac{4}{7}$ of the first equals $\frac{3}{4}$ of the second; what are the numbers?

82. The sum of two fractions is $1\frac{1}{4}$, and the difference $\frac{5}{8}$; what are the fractions?

83. Half the difference between the sum and difference of two numbers is 28; what are the numbers if the less is to the greater as 4 is to 5?

84. If $\frac{4}{5}$ of J's money equals $\frac{3}{4}$ of H's, and H has \$687 less than J; how much has each?

85. E and F have \$6825; 5 times E's money equals 8 times F's money; how much has each?

86. A farmer raised 6720 bu. of corn and oats; 8 times the number of bu. of oats plus 120 bu. equals the number of bu. of corn; how many bu. of each?

87. A and B own a tract of land; $\frac{4}{5}$ of A's equals $\frac{4}{5}$ of B's, and $\frac{6}{5}$ of A's plus 80 acres equals $\frac{6}{5}$ of B's; how much has each?

88. C and D had a piece of land; C sold 60 acres and D bought 100 acres, when $\frac{4}{5}$ of C's equals $\frac{3}{4}$ of D's; how many acres had each at first?

Conjoined Proportion.

89. If 3 bananas are worth 1 lemon, and 5 lemons are worth 4 oranges; how many bananas are worth 1 doz. oranges?

90. Find the cost of 10 doz. eggs if 5 doz. eggs are worth 4 lb. of butter, and 8 lb. of butter are worth 3 lb. of coffee, and 6 lb. of coffee are worth \$2.

91. If 20 horses are worth 48 cows, and 9 cows are worth 54 sheep, and 64 sheep are worth 60 pigs, and 4 pigs are worth \$20, what are 88 horses worth?

92. A can do as much work in 7 days as B can do in 8, B in 6 as C in 5, C in 5 as D in 7, D in 8 as E in 9; how long will it take E to do the work which A does in 10 da.?

93. If 5 lb. butter are worth 15 lb. sugar, 20 lb. sugar 10 doz. eggs, 80 doz. eggs 15 cans peaches, 5 cans peaches 8 qt. berries, 24 qt. berries 10 lb. coffee, and 2 lb. coffee 10 lb. rice, how much rice will 80 lb. butter buy?

94. If 20 bu. wheat are worth 25 bu. rye, 95 bu. rye 186 bu. corn, 27 bu. corn 86 bu. oats, and $8\frac{1}{2}$ bu. oats 25 lb. sugar, how many lb. of sugar can be had for 57 bu. of wheat?

95. If twice a number equals 3 times another number, and 5 times the second number equals 3 times a third number, and 4 times the third number equals 5 times a fourth number, and 6 times the fourth number equals 48, what is the first number?

96. If $\frac{2}{3}$ of a number equals $\frac{1}{2}$ of another number, and $\frac{1}{2}$ of the second equals $\frac{1}{3}$ of a third, and $\frac{1}{3}$ of the third equals $7\frac{1}{2}$ times $8\frac{1}{3}$, what is the first number?

97. If 4 yd. calico are worth $3\frac{1}{2}$ yd. muslin, and $4\frac{1}{2}$ yd. muslin are worth 4 yd. gingham, and $4\frac{2}{3}$ yd. gingham are worth 4 yd. crash, and 5 yd. crash are worth $4\frac{1}{2}$ yd. drilling, and 8 yd. drilling are worth 2 yd. satteen, and 5 yd. satteen are worth 6 yd. silesia and silesia is $12\frac{1}{2}$ ct. a yd., how much is left of \$10 when 10 yd. of each are bought?

98. A farmer wishes to raise a sum of money which he can obtain at prevailing prices by the sale of 240 bu. wheat, or 800 bu. rye, or 860 bu. corn, or 450 bu. oats. If he sells 40 bu. wheat, 50 bu. rye, and 100 bu. oats, how much corn must he sell to raise the required amount?

PARTNERSHIP.**37. Problems in Partnership.**

1. A and B form a partnership; A puts in \$9000 and B \$11000; they gain \$8000; how much should each receive?

2. Three men purchase a store, the first paying \$4000, the second \$8000, and the third \$20000; they rent it for \$9600 for 8 yr.; how much of the rent does each receive?

3. C, D, and E rent a ranche for \$2400; C puts in 96 horses, D 84 horses, and E 70 horses; how much should each pay?

4. G, L, and R gain \$4500; G's gain is \$1600, L's \$2000, and R's capital \$7650; what is the capital of G and L?

5. M, W, and B are partners with \$20200 capital; M's gain for the year is \$2460, W's, \$2250, and B's, \$1850; what capital did each furnish?

6. W, B and H sink a coal shaft, W contributing \$7000, B \$8000, and H \$5000; H receives \$1200 a yr. for superintending the work. They sell 20,000 tons of coal at an average of \$1.10 a ton; after paying 50 ct. a ton for mining and \$5000 for other expenses, what is the net profit of each?

7. A, B, C, and D rent a pasture for \$420; A puts in 24 horses, B 20 horses, C 24 cows and D 82 sheep; what should each pay, if 5 horses eat as much as 6 cows, and 8 cows eat as much as 5 sheep?

8. J, H, and K engaged in business for 8 years, and made a profit of \$9462. What should each receive, if $\frac{2}{3}$ of J's capital equals $\frac{1}{4}$ K's and $\frac{1}{3}$ of H's?

9. A, B, C and D engage in merchandising for 2 years. B put in \$7770 and the gain is respectively \$1265, \$1771, \$2788, and \$8289; what amount did each put in?

10. A milling firm has \$17640 invested. J furnished \$11 as often as K furnished \$6, L \$5, and M \$8; their gross earnings are \$8200, and expenses \$5554; what is the net profit of each?

11. A, B and C do a job of work for \$47.40; A worked 8 hr. a day for 5 da., B 8 hr. a day for 8 da., and C 9 hr. a day for 6 da.; how much should each receive?

12. W commenced business with \$3600 stock; 2 mo. after he took in L with a capital of \$3000, and a month later N with a capital of \$2800; at the end of the year the firm had gained \$2214; find the share of each.

13. A and B formed a partnership for 2 yr.; A invested \$7000 at the beginning but at the end of 1 yr. withdrew \$2000; B invested \$7000 at the beginning and at the end of 1 yr. \$2000 more; how much should each receive of the \$4200 which they gain?

14. B and C engage in trade with \$6000 each; at the end of 8 mo. they admit D with a capital of \$10000; 8 mo. later B withdraws \$1500; at the end of the year they have lost \$1575; required the loss of each.

15. O, P and Q engage in business. O invests \$3600 for 8 mo.; P a certain sum for 11 mo.; Q \$4200 for a certain time. O received \$4176 as his capital and profit; P, \$3294; and Q, \$4956; find P's capital and Q's time.

16. A and B go into business with capitals in the ratio of 6 to 5; at the end of 5 mo. they withdraw respectively $\frac{2}{3}$ and $\frac{1}{3}$ of their capitals; at the end of the year their profits are \$9668; what is each one's share of the gain?

17. A and B form a partnership. A puts in \$14000 and is to have $\frac{2}{3}$ of the profits; B puts in \$14000 and is to have $\frac{1}{3}$ of the profits; each partner is to receive or pay interest at 7% per annum for any excess or deficit in his proportionate share of capital. At the end of the first year the profits are \$1450. Required the capital of each man.

INVOLUTION AND EVOLUTION.

38. Problems in Powers and Roots.

1. Learn the squares of all numbers to 25, and the cubes to 12.

Square each of the following:—

- | | | |
|--------|--------------------|----------------------|
| 2. 18 | 7. 99 | 12. $16\frac{2}{3}$ |
| 3. 87 | 8. 4.5 | 13. .125 |
| 4. 105 | 9. $\frac{2}{3}$ | 14. .015 |
| 5. 462 | 10. 17.5 | 15. $5.6\frac{2}{3}$ |
| 6. 729 | 11. $2\frac{1}{2}$ | 16. 8.08 |

17. Cube each of the above numbers.

Find the value of

- | | | |
|--------------------------|----------------------------------|--------------|
| 18. $8^3 \times 8^2$ | 23. $8^5 \times 8^5$ | 28. 225^3 |
| 19. $7^3 \times 7^2$ | 24. $5^6 \times 7^4$ | 29. 4081^2 |
| 20. $25^2 \times 25^2$ | 25. $(\frac{1}{7})^2$ | 30. 4965^2 |
| 21. $1.5^2 \times 1.5^4$ | 26. $(\frac{1}{2})^3$ | 31. 9999^2 |
| 22. $12^3 \times 12^4$ | 27. $(\frac{8}{8\frac{1}{2}})^4$ | 32. 2245^2 |

33. Raise 8 to the twentieth power.
34. Raise 10 to the tenth power.
35. Raise $12\frac{1}{2}$ to the fourth power.
36. Cube the square of 6.
37. What power is the square of the fifth power of a number?
38. The cube of the fourth power is what power?
39. What power is the product of the first power by the third power by the eighth power?
40. The square of a number equals 9 times that number; what is the number?
41. What number multiplied by 8 gives $\frac{1}{2}$ of the square of the number for a product?
42. What is the difference between $(5^2)^3$ and $(5^3)^2$?
43. What is the difference between $(4^2)^3$ and $4^2 \times 4^3$?

44. What is the difference between 7^7 and $7^3 \times 7^4$?
45. The square of $\frac{3}{4}$ of a number is 144; what is the number?
46. The square of 8 times a number is 150 greater than 8 times the square of the number; what is the number?
47. 20 is 4 less than 8 times the cube of a number; what is the number?
48. The square of a number divided by the number equals 11; what is the number?
49. The square of a number divided by $\frac{1}{3}$ of the number equals 18; what is the number?
50. The cube of a number divided by the number equals 169; what is the number?
51. The cube of a number divided by $\frac{3}{4}$ of the number equals 216; what is the number?

Find the square root of

- | | | |
|-----------|--------------|-------------------------|
| 52. 256 | 57. 186624 | 62. 25.6 |
| 53. 1156 | 58. 2050624 | 63. $\frac{876}{18888}$ |
| 54. 18225 | 59. 196.2801 | 64. $\frac{86}{100}$ |
| 55. 47524 | 60. 994009 | 65. $\frac{1}{3}$ |
| 56. 8025 | 61. 2.56 | 66. $\frac{16}{36}$ |

Note.—Roots need not be extended beyond thousandths.

Complete the following equations:

- | | |
|---|--|
| 67. $\sqrt{256} + 256^2 = ?$ | 69. $(\frac{64}{188})^{\frac{1}{2}} \times \sqrt{80625} = ?$ |
| 68. $\sqrt{80.25} + 64^{\frac{1}{2}} = ?$ | 70. $(\frac{1}{2})^{\frac{1}{2}} \times ? = .4$ |
| 71. $\sqrt{2.25} + \sqrt{289} + \sqrt[3]{16 \times 25} = ?$ | |
| 72. $\sqrt{81^4} \times \sqrt[3]{21.8444} = \sqrt[3]{729} \times ?$ | |
| 73. $64^2 \div \sqrt{64} = ? \times \sqrt{16}$ | |

Applications of Square Root.

74. A square field contains 4225 sq. rd.; what is the length of each side?

75. A square farm contains 54 acres, 9 sq. rd.; what is the length of each side?

76. A lot 8 times as long as it is wide contains 9240 $\frac{1}{2}$ sq. ft.; what are its dimensions?

77. What is the distance from the N. E. to the S. W. corner of a rectangular lot 20 rd. by 21 rd.?

78. A gate 12 ft. wide 5 ft. high has a rod for a brace reaching from one lower corner to the opposite upper corner; what is its length?

79. How many rods will enclose a square field whose diagonal is 100 rods?

80. How many acres in the above field?

81. What is the length of a field twice as long as wide containing 17 acres 92 $\frac{1}{2}$ sq. rd.?

82. A field four times as long as it is wide contains 62 $\frac{1}{2}$ acres; required the dimensions.

83. A field contains 15 acres 135 sq. rd., and its length is to its breadth as 5 to 3; what will it cost to fence it at 85 ct. per rd.?

84. Two trains start from the same place at the same time, the one going north 48 mi. an hr., and the other west 36 mi. an hr.; how far apart will they be in 12 hr.?

85. A flag-pole 120 ft. high had 75 ft. of its top broken off. If it hangs on the stump, how far from the foot did it strike the ground?

86. A room is 13 ft. long 12 ft. wide and 10 ft. high. What is the longest line that can be stretched on the floor? In the room?

Find the mean proportional between

87. 25 and 100. 90. 11 and 99.

88. 36 and 1296. 91. $\frac{2}{3}$ and $1\frac{5}{7}$.

89. 10.8 and 19.2 92. $\frac{5}{8}$ and $3\frac{1}{2}$.

Find the cube root of

93. 848 95. 10648 97. 49027896

94. 6859 96. 5545238 98. 3869898

99.	4065856786	102.	970299000	105.	2571.858
100.	122768478	103.	15.625	106.	$1\frac{3}{8}$
101.	985074875	104.	1860.867	107.	$18\frac{1}{4}$

Complete the following equations:

$$108. \sqrt[3]{54872} + \sqrt[3]{175616} = ?$$

$$109. (889.017)^{\frac{1}{2}} \times (259.964072)^{\frac{1}{2}} = ?$$

$$110. \sqrt[3]{1728 \times 1881} + \sqrt[3]{729} \div \sqrt[3]{27} = ?$$

$$111. (\frac{2}{3}\frac{1}{4})^{\frac{1}{2}} \times (\frac{1}{2}\frac{1}{4})^{\frac{1}{2}} \times ? = 17.$$

$$112. (\sqrt{64} \times \sqrt[3]{64}) \times (\sqrt{4096} \div \sqrt[3]{4096}) = ?$$

$$113. \frac{\sqrt[4]{169}}{\sqrt[4]{4096}} \times 1\frac{3}{4} = ?$$

$$114. (\sqrt{5} \times \sqrt{5}) \times (\sqrt[3]{8} \times 27) = ?$$

$$115. \sqrt[4]{16 \times (\frac{3}{4})^4} = ?$$

$$116. (\frac{1}{10}\frac{2}{4})^{\frac{1}{2}} + (\frac{6}{12}\frac{5}{8})^{\frac{1}{2}} = ?$$

$$117. \sqrt[4]{20736} + \sqrt[4]{44100} = ?$$

$$118. \sqrt[5]{248832} = ?$$

$$119. \sqrt[4]{890625} = ?$$

Applications of Cube Root.

120. The cubical base for a monument contains 82768 cu. in.; what is its height?

121. The area of one side of a cube is 2116 sq. in.; what is the volume?

122. What is the entire surface of a cube whose cubical contents are 729000 cu. ft.?

123. What is the entire length of the edges of a cube containing 19683 cu. in.?

124. What is the longest straight line that can be drawn on the surface of a cube containing 4913 cu. in.?

125. The cube of a number cubed is 262144; what is the number?

126. What is the edge of a cube equivalent to a rectangular solid 14 ft. by 28 ft. by 56 ft.?

127. Find the dimensions of a cubical cistern that will hold 100 bbl. of water.

128. Find the dimensions of a cubical bin that will hold 1000 bu. of wheat; 1000 bu. potatoes.

129. The dimensions of a bin are to each other as 2, 8, and 4, and its capacity 5184 cu. ft. What are its dimensions?

130. Find the dimensions of a rectangular bin with a capacity of 15860 cu. ft., whose length, breadth and height are to each other as 5, 8, and 2.

131. How many cubical blocks $1\frac{1}{2}$ in. long can be packed in a box each of whose dimensions is 2 ft.?

132. The cube of a number cubed is 248 times the square of the number squared. Find the number.

133. What is the difference between a 8-foot cube and 8 cu. ft.?

134. The length of two cubes are to each other as 2 to 6. How do their volumes compare?

135. Find the cube root of 1728 by factoring. (See p. 24.)

136. By factoring find the cube root of 27 times 64 times 125.

137. By factoring find the cube root of the product of $9 \times 81 \times 4 \times 16$.

138. By factoring find the fourth root of 16 times 256—of 81 times 625.

139. Find the fifth root of the product of the following numbers: 8, 9, 4, 27.

140. A wall 6 times as high as it is broad and 16 times as long as it is high contains 1944 cu. ft. Find its dimensions.

MENSURATION.**39. Problems in Mensuration.**

1. How many acres in a rectangular field 65 rd. long and 48 rd. wide?
2. A rectangular field containing $21\frac{1}{8}$ acres is 57 rd. 11 ft. wide; what is its length?
3. A house is 32 ft. wide and the gable peak rises 14 ft. above the corners; what will siding cost to cover the gable at \$2.25 per C, allowing $\frac{1}{8}$ for waste?
4. A triangular field containing 18 A. 95 sq. rd., has an altitude of 70 rd. Required the base.
5. The sides of a triangular field are 60, 70 and 90 rd. respectively. What is its area?
6. One side of a rhombus measures 18 ft., and the distance between its parallel sides is 12 ft. What is its area?
7. How many acres in a rhomboidal field whose length is 60 rd. and altitude 45 rd.?
8. What is the area of a rhombus whose diagonals are 45 rd. and 60 rd. respectively?
9. Required the area of a trapezoid the sides of which are 240 yd. and 210 yd., and the altitude 180 yd.
10. How many ft. in a board 16 ft. long, 16 in. wide at one end and 8 in. at the other?
11. What is the altitude of a field containing 69 A. 10 sq. rd. in the form of a trapezoid, the length of the parallel sides being 75 rd. and 95 rd. respectively?
12. How many acres in a field in the form of a parallelogram, the length being 72 rd., the perpendicular breadth 50 rd. and the slant breadth 60 rd.?
13. At \$75 an acre, what is the value of a field, one of the parallel sides of which is 40 rd., the other 120 rd., and the perpendicular distance between them 72 rd.?

14. Find the area of a trapezium whose diagonal is 50 in., and the perpendicular distance from the diagonal to the opposite corners 20 in. and 25 in. respectively.

15. How many acres in a trapeziform field whose sides are 80 rd., 120 rd., 100 rd. and 140 rd., and the longer diagonal 160 rd.?

16. Find the circumference of a circle whose diameter is 75 ft.

17. What will it cost to fence a circular park 70 rd. in diameter at \$2.90 a rd.?

18. What is the diameter of a race-track 880 ft. in circumference?

19. The trunk of a tree measures 10.2102 ft. in circumference; what will be the distance across the stump when it is cut down?

20. How many ft. of hoop-iron will make 4 hoops for a tank 8 ft. in diameter and $4\frac{1}{2}$ ft. deep?

21. How much land is enclosed by a circular race track $\frac{7}{8}$ mi. in circumference?

22. What is the largest square that can be cut from a circular cardboard 10 in. in diam.?

23. What is the largest square stick of timber that can be cut from a log 2 ft. in diameter?

24. What must be the girth of a tree from which I may cut a ten-inch sill?

25. What is the area of an ellipse whose major axis is 80 in. and minor axis 24 in.? (NOTE.—The area equals the product of the semi-axes by 3.1416.)

26. Find the area of an elliptical mirror 42 in. long and 28 in. wide.

27. A timber 12 ft. long 16 in. by 12 in. is sawed into two triangular pieces; find their entire surface.

28. Find the entire surface of a paralelopipedon whose bases are 10 in. and 16 in., and the altitude 14 ft.

29. How much lumber in a triangular strip $1\frac{1}{2}$ in. by 2 in. by $2\frac{1}{2}$ in. and 16 ft. long?

30. Find the cost of painting the convex surface of a standpipe 20 ft. in diameter and 80 ft. high, at 80 ct. per sq. yd.

31. How much sheet-iron in an oil-tank 6 ft. 6 in. in diameter and 28 ft. long?

32. How many sq. ft. of tin in 180 ft. of furnace pipes 9 in. in diameter?

33. What are the solid contents of a log 16 ft. long and 2 ft. 6 in. in diameter?

34. How many feet of inch lumber will the above log make, allowing $\frac{1}{4}$ for waste in sawing?

35. Required the convex surface of a pyramid the sides of whose base are 20 ft., 25 ft. and 30 ft., and the slant edge 80 ft.

36. Find the entire surface of a triangular pyramid whose base is a right angled triangle, with its sides respectively 5, 8, and 10 in., and whose slant edge is 8 ft.

37. An octagonal church spire whose slant height is 28 ft., is 8 ft. 6 in. on each side at the base. Find the convex surface.

38. The base of a square pyramid covers $\frac{3}{4}$ of an acre and is 860 ft. high. How many yd. of earth does it contain?

39. How many yd. of canvas will cover a conical haystack 10 ft. in diameter and 15 ft. high?

40. Allowing 10 cu. yd. to the ton a conical haystack contains $14\frac{1}{3}$ tons. If the stack is 24 ft. high, what is the diameter of the base?

I. What is the slant height of the largest cone that may be cut from a cylindrical block 2 ft. 6 in. in diameter and containing 89.27 cu. ft.?

42. An oak log 8 ft. in diameter at one end and 2 ft. at the other weighs 8 T. 606 lb. $5\frac{1}{2}$ oz., allowing 850 oz. to the cu. ft.; what is its length?

43. Find the cost at \$20 per M, board measurement, of 200 posts 5 in. square at one end, 4 in. at the other and 7 ft. long.

44. If the diameter of the earth is 8000 mi. and $\frac{1}{4}$ of its surface is water, what is its land area? What are its solid contents?

45. If a cu. ft. of silver weighs 650 lb., what is the diameter of a solid silver globe which weighs 5817.8125 lb.?

46. What is the diameter of a wooden sphere from which may be cut a cube 18.8564 in. long?

47. A field is 40 rd. long and 82 rd. wide; what are the dimensions of a similar field containing 72 acres?

48. If a 4 in. tile discharge 2 bbl. of water in a minute how much will a 10 in. tile discharge in an hour?

49. A circular reservoir in the center of a circular park is $2\frac{1}{2}$ rd. in diameter; what is the cost at \$2 a rd. of fencing the park which is 400 times as large as the reservoir?

50. How many grape shot an in. in diameter will make a cannon ball 9 in. in diameter?

51. How many loads of earth are required to raise a lot 162 ft. long and 40 ft. wide, 15 in.?

52. The sides of a rectangular field are to each other as 4 to 5 and its area is $24\frac{1}{2}$ acres; find its dimensions.

53. At 10 ct. a sq. rd., what will it cost to gravel a driveway $44\frac{1}{2}$ ft. wide on the border of a circular park 40 rd. in diameter?

54. The standard bu. of the U. S. is a cylindrical measure 18 $\frac{1}{2}$ in. in diameter and 8 in. deep; what are the dimensions of a similar half-bushel measure?

MISCELLANEOUS PROBLEMS.

1. Two men do half a piece of work in 7 days, and then one of them finishes it in 12 days. How long would it have taken the other to finish it?

2. Ten years ago John was $\frac{1}{3}$ as old as his uncle, and 8 years hence he will be $\frac{1}{2}$ as old; how old is John?

3. I sold $\frac{2}{3}$ of my farm for what $\frac{1}{3}$ of it cost; at the same rate of profit, what is the value of $\frac{2}{3}$ of the remainder if I gained \$2100 on the part sold?

4. From a vat $\frac{3}{4}$ full of oil were drawn 40 gal., when it was $\frac{1}{4}$ full; find its capacity.

5. A drover sold some sheep for \$272; had he sold 8 times as many at 50 ct. less each, he would have received \$720; how many did he sell, and at what price?

6. A boy bought an equal number of apples and pears, apples at 20 ct. per doz. and pears at 30 ct. per doz.; if he sell an apple and a pear for 5 ct., how many must he sell to clear \$8?

7. What number multiplied by half of itself will give $40\frac{1}{2}$?

8. A farmer has 25 head of cattle and hay enough to last them 6 mo.; if he buy 10 head more, how long will it last them?

9. A steamboat whose rate of travel is 15 mi. an hr. in still water can go 54 mi. and return in $7\frac{1}{2}$ hr.; what is the velocity of the stream?

10. A surveyor's chain used in measuring a square 40-acre field was found to be 1 li. short; how much did the field lack of 40 acres?

11. The product of the sum of two numbers by their difference is 696; the one is 28; what is the other?

12. From the middle of the side of a square field containing 40 acres, B runs a line cutting off $15\frac{1}{2}$ acres; what is the length of the line?

13. Resolve 18 into two factors, one of which shall be $12\frac{1}{2}$ times the other.

14. How far is it necessary to carry the test to determine that a number is prime?

15. A hand agreed to work a year on a farm for \$276 and a suit of clothes; having worked 8 mo., his employer sold his farm, and the hand received \$175.75 and the suit of clothes; what was the value of the suit?

16. Two horses were sold at the same price, one at a gain of 25% and the other at a loss of 25%; the whole loss was \$16; what was the cost of each horse?

17. How wide a strip must be mowed around a square 10-acre field to mow $\frac{1}{16}$ of it?

18. At what time between 6 and 7 o'clock are the hour and minute hands together?

19. By selling a horse at a certain price I gain $16\frac{2}{3}\%$; but if the horse had cost me \$20 less I would have gained 40%; what did the horse cost?

20. A merchant bought goods on 8 mo. credit; after 8 mo. he sold them for \$2000, 5% off for cash; his gain was 25%, money being worth 6%; what did he pay for the goods?

21. Over how much ground can a calf graze when tied by a rope 40 ft. long to the top of a post 4 ft. high?

22. Four-fifths of the selling price of goods is $\frac{1}{10}$ of the cost; what is the gain per cent. at which the goods were sold?

23. At \$1.20 per rod, how much more will it cost to fence $25\frac{1}{2}$ acres in the form of a rectangle whose sides are as 16 is to 25 than if it were square?

24. Two men do as much in a factory as 8 boys, and 4 boys do as much as 5 girls; how long will it take 2 boys and 6 girls to do as much as 6 men, 6 boys and 6 girls do in a week?

25. A father willed \$81200 to his two sons, J and H, aged 12 and 16 years respectively, to be divided in such a manner that the two shares, on interest at 8%, would amount to equal sums when they became of age; find the share of each.

26. $\frac{4}{11}$ of A's money equals $\frac{3}{11}$ of C's, and A has \$57 more than C; how much has C?

27. A commission merchant bought 200 crates of berries at \$2.50 a crate, and sold 25% of them at a gain of 10%, 20% of them at a loss of 40%, and the remainder at a gain of 80%; what was his gain?

28. Two trees stand on opposite sides of a stream, 40 ft. wide; the height of one tree is to the width of the stream as 8 is to 4, and the width of the stream is to the height of the other as 4 is to 5; what is the distance between their tops?

29. Two 40-gal. barrels of vinegar, one costing 14 ct. a gal. and the other 16 ct. a gal., are mixed and enough water added to sell at 20 ct. a gal. and gain $66\frac{2}{3}\%$; how much water was added?

30. A has 6 oranges and B 4 oranges; C says let me share equally with you and I will give you 10 ct.; how much of the money will A get?

31. If I ask for a horse 20% more than he cost me, but afterwards make a deduction of 10% from my asking price, and thus receive \$189, what did the horse cost me?

32. What is gained on 240 shares of stock bought so that by selling at 16% discount, $16\frac{2}{3}\%$ is gained on the investment?

33. If a grocer buy eggs at $12\frac{1}{2}$ ct. per doz. and sell at the rate of 75 for \$1, how many must he sell to gain \$42?

34. Divide \$2970, giving B $\frac{3}{4}$ as much as A, and C $\frac{4}{5}$ as much as B.

35. If goods are bought at 20% below list price, with 5% off for cash, and sold at $12\frac{1}{2}$ % above list price, what % is gained?

36. What must be the tax rate on an assessed valuation of \$8,125,000 to raise \$24,255, allowing 2% for collecting and 1% delinquent?

37. $\frac{3}{4}$ of the time past noon equals $\frac{1}{2}$ of the time to midnight; what is the time?

38. Reduce $8\frac{1}{4}$ to 25ths.

39. The product of two numbers is 576, and they are to each other as 16 to 9; what are they?

40. At what price must hats costing \$1.80 be marked to gain 20% after deducting 10%?

41. Bought a buggy for \$60, which is $\frac{3}{4}$ of $5\frac{1}{2}$ times the cost of the harness; what did the harness cost?

42. A, B, and C start at the same place to travel around an island, A making the circuit in $\frac{2}{3}$ of an hr., B in $\frac{4}{5}$ of an hr., and C in $\frac{5}{6}$ of an hr.; in how many hours will they meet at the starting place, and how many circuits does each make?

43. Find the rate of gain or loss when $\frac{3}{4}$ of the price paid for an article equals $\frac{1}{2}$ of the selling price.

44. A block 800 ft. square is surrounded by a brick walk 1 ft. outside of the fence; the cost, at \$9 per M, for brick in the walk was \$824,855; how wide was it?

45. A man received \$2 $\frac{1}{2}$ a day for work and spent \$1 $\frac{1}{2}$ each day he was idle; he was idle $\frac{3}{4}$ as many days as he worked, and at the end of the time he received \$22 $\frac{1}{2}$; how many days did he work?

46. If it costs \$27 to paint a spire 14 ft. in diameter and 45 ft. high, how much will it cost to paint a similar spire 65 ft. high?

47. What is the weight of a man 6 ft. tall if a man of similar build 5 ft. 8 in. tall weighs 148 lb.?

48. The sum of two numbers is 2875, and one bears the same relation to $\frac{1}{2}$ as the other to $\frac{3}{4}$. What are the numbers?

49. A corporation declares an annual dividend of \$120,000, at 4%; the next year the capital is increased 20% and the per cent. of profit doubled and a dividend of 6% is declared; how many shares of watered stock were issued?

50. A can cut a field of wheat in 8 da., B in $4\frac{1}{2}$ da., and A, B, and C in $1\frac{1}{2}$ da.; in what time can C do it alone?

51. A fruit dealer buys 242 doz. oranges at 18 ct. a doz.; 104 are spoiled; he sells the rest at the rate of 14 for 25 ct.; how many must he buy that his gain may be \$46.85?

52. At \$1 $\frac{1}{2}$ a rd. what cost the fencing of a rectangular field whose sides are to each other as 2 to $4\frac{1}{2}$, which would have cost \$294 had it been square?

53. An 8-in. drain tile starts in at one corner of a square 40-acre field and comes out 20 rd. from the corner diagonally opposite; the tile cost \$24 per M and the ditch, with an average depth of 8 ft. 6 in., cost 10 ct. per rd. a ft. deep. Find the entire cost.

54. If the above drain flows half full at a velocity of $2\frac{1}{2}$ ft. per sec., how much water is discharged each hour?

55. After spending $\frac{1}{3}$ of my money and $\frac{3}{8}$ of the remainder, I find that I had spent \$91 more than I had left; how much had I left?

56. A boat sails 10 mi. an hr. down stream and 4 mi. an hr. up stream, how far can it go and return in 7 hr.?

57. A pasture will feed 20 horses or 30 cows; if 12 cows are in the pasture how many horses may be put in?

58. At what time between 4 and 5 o'clock is the hour hand as far from 8 as the minute hand is from 9?

59. A and B can do a job of work in $6\frac{3}{4}$ da.; A and C, in $7\frac{1}{2}$ da.; and B and C, in $8\frac{1}{4}$ da.; in what time can each do it alone?

60. A man and his boy can do some work in 10 da.; if the boy does as much in $8\frac{3}{4}$ da. as the man does in $2\frac{1}{2}$ da., how long will it take each to do it alone?

61. How many circular openings $\frac{1}{16}$ in. in diameter will discharge from a sprinkler the water let in by a pipe $\frac{3}{8}$ in. bore?

62. How many lb. of sheet zinc, weighing 8 oz. to the sq. ft., will cover a cubical block containing $15\frac{5}{8}$ cu. ft.?

63. Two carpenters earn \$248; $\frac{3}{4}$ of what the first earns plus \$22 equals $\frac{1}{3}$ of what the second earns; how much does each earn?

64. $\frac{1}{2}$ of A's money plus $\frac{2}{3}$ of B's equals \$5500; and $\frac{2}{3}$ of B's is 4 times $\frac{1}{2}$ of A's; how much has each?

65. A, wishing to sell a cow and a horse, asked 150% more for the horse than for the cow; he then reduced the price of the cow 25% and the horse $33\frac{1}{3}\%$, at which price B took them, paying \$290; what was the price of each?

66. Sixty-four persons charter a car to Niagara Falls but 14 of them decline going, by which the expense to each of the others is increased \$1.05; what did the car cost?

67. A square field containing 40 acres contains a circular race-track as large as possible; how many acres in the field outside of the track?

68. With a capital of \$60000 a firm sells goods in 1 yr. to the amount of \$805000 at 15% profit; the expenses were 8% of the sales and the loss by bad debts $1\frac{1}{2}\%$; what was the net profit, money being worth 7%?

69. My rooms require 84 yd. of carpet $\frac{3}{4}$ yd. wide, which I buy at \$1.20 a yd., but it proves to be but $25\frac{1}{2}$ in. wide; what will be the cost of enough more of the same to supply the lack?

70. A and B buy a conical haystack 80 ft. high and 25 ft. in diameter at the base, for \$120; A takes from the top until the altitude is reduced one half, and B takes the remainder; how much should each pay?

71. I buy goods on 4 mo. time listed at \$7500, with 80% discount and 6% off for cash. For what sum must my note be given, at 8%, for 90 da. to cash my bill?

72. How must I mark hats which cost \$8.50, that I may deduct 20% and still make 20%?

73. Had I sold my oranges 2 doz. for 25 ct. I should have lost 27 ct.; but by selling 4 for 5 ct. I gained 18 ct.; what was the cost per doz.?

74. A rich uncle left a sum of money to his 3 nephews whose ages differ by 2 yr., in such shares that if put at interest, at 5%, they should share equally on becoming of age; the share of the youngest was $\frac{2}{3}$ of his amount, and the amount received by all was \$24570; find the original sum left them.

75. How wide a strip around a circular pond $1\frac{1}{2}$ mi. in circumference must be drained to reduce its area one half?

76. A gallon bucket is 5 in. in diameter; what is its depth?

77. C's money is \$10 less than $\frac{4}{5}$ of D's, and \$5 more than $\frac{8}{9}$ of D's; how much has each?

78. On a piece of work 6 men and 5 boys are employed who do $\frac{3}{10}$ of it in 2 da. After this 2 more men and 8 more boys are put on and $\frac{2}{3}$ more is done in 8 da. If 2 more men are put on, how long will it take all to finish it?

79. If the price of $4\frac{1}{2}\%$ stock is 87, a person can obtain an annual income of \$9 more than he can if the price were 89; how much has he to invest?

80. A rabbit 800 ft. ahead of a dog takes 8 leaps to the dog's 2; the dog leaps 10 ft. and the rabbit 6 ft.; how many leaps will the rabbit take before it is overtaken by the dog?

81. I owe \$11186.86; $\frac{1}{2}$ due in 4 mo., $\frac{2}{3}$ of the remainder due in 6 mo., and the remainder due in 1 yr.; how much cash will pay the debt now, money being worth 6%?

82. How much invested in $4\frac{1}{2}\%$ bonds at 96 will yield the same income as \$14850 in 5% bonds at 110?

83. A man walked $\frac{1}{4}$ of his journey the first day, $\frac{1}{8}$ of the remainder plus 15 mi. the second, when the distance traveled was half the remainder; how long was the journey?

84. If $\frac{2}{3}$ of 12 were 8, what would $\frac{3}{4}$ of 15 be?

85. Divide the g. c. d. of $51\frac{1}{4}$ and $71\frac{3}{4}$ by the l. c. m. of $\frac{1}{4}$, $\frac{1}{8}$ and $\frac{1}{16}$.

86. The amount of a certain principal at 6%, for a given time is \$956, and at 8% for the same time it is \$1008; find the time and principal.

87. A water main 1820 ft. long is 6 in. in diameter outside with a 4-in. opening; what will it cost at \$12 a ton, if a cu. in. weighs .26 lb.?

88. The end of the minute hand of a court-house clock passes over $1\frac{1}{2}$ ft. in 8 minutes; what is the length of the minute hand?

89. If a clock which gains 4 min. a day be set right at noon Jan. 1, 1900, what will be the right time when that clock shows noon 10 da. later? If kept going when will it next show the right time?

90. If a cu. ft. of snow makes $\frac{1}{2}$ gal. of water, how much water will snow 7 in. deep 118 ft. by 88 ft. make?

91. A rectangular piece of corn, measured from the outside rows, contains $21\frac{1}{2}$ acres; its dimensions being as 2 to 3, and the hills 3 ft. 8 in. apart; what will it cost to cut it in shocks 16 hills square at 16 ct. a shock?

92. Divide 75 acres into two fields whose areas are to each other as $4\frac{1}{2}$ to $5\frac{1}{2}$.

93. My wheat makes 44 lb. of flour to the bu. How much wheat must I take to the mill to get 11 bbl. of flour allowing for toll at the rate of 4 qt. to the bu.?

94. How long is one edge of a pyramid 320 ft. high and 480 ft. square?

95. A man left by will to his wife, son, and daughter \$52910, the widow to receive $\frac{1}{4}$ if the daughter die before becoming of age; but if the son die the widow should have $\frac{1}{4}$ of the fortune. If neither die how shall it be divided?

96. If the value of 100 lb. geese equal 84 lb. turkeys, and 50 lb. chickens equal 3 bu. potatoes, and 9 bu. turnips equal 4 bu. apples, and 6 bu. turnips equal 2 bu. onions, and 5 bu. onions equal 72 lb. turkeys, and 12 lb. geese equal 14 lb. chickens, and 2 bu. apples equal 86 lb. sugar, how many lb. sugar can be had for 5 bu. potatoes?

97. What % is gained by investing \$2572500 in 6% bonds at 105, if they are redeemed after ten years at par?

98. What is the area of an octagonal flower-bed in a park each side of which is 10 ft.?

99. How many times does a clock which strikes the half hours strike in a week?

100. What is the shortest distance a spider may crawl on walls and ceiling or floor, from an upper corner to the opposite lower corner of a room whose length is 40 ft., breadth 30 ft., and height 16 ft.?

101. The shadow cast by a tree coincides with that of a post 4 ft. high and 8rd. from it, both striking the ground at the same point; the distance from the end of the shadow to the top of the post is 5 ft.; what is the height of the tree?

102. In the paper of a ceiling 24 ft. square are four circular figures as large as possible, with their edges touching. How much space between them?

103. A starts at D and travels east 20 mi., and B starts from the same place and travels north-west 20 mi. How far apart are they?

104. Goods bought at 25%, 20%, and 10% off and sold at a gain of 15% gives \$1705.50 below list price; what was the list price of the bill?

105. John takes 16 paces while Harry takes 15, but 18 of Harry's paces equal 15 of John's; if John's pace is 2 ft. 2 in., how far will he walk while Harry walks a mile?

106. Divide \$640 among A, B, and C, so that A's shall be $\frac{1}{2}$ greater than B's, and B's $\frac{1}{3}$ less than C's.

107. The distance from the center to each corner of a rectangular field whose length is $\frac{1}{3}$ greater than its width, is 50 rd.; how many acres in the field?

108. Two carpenters engage to build a house for \$810; the first worked $\frac{4}{5}$ as many days as the second, plus 54, and received \$450; how many days did each work?

109. The capacity of a room whose width is $\frac{2}{3}$ of its length, and its height $\frac{3}{4}$ of its width is 4608 cu. ft.; what are its dimensions?

110. At what time between 7 and 8 o'clock is the hour hand of a clock half way between the minute hand and 6?

111. At what time will the hour hand and minute hand be together the second time after 12 o'clock?

112. A vein of coal $7\frac{1}{2}$ ft. thick is sold at \$100 an acre. Allowing 86 lb. to the cu. ft., how much is that a ton?

113. M discounts a note at 25% per annum, and gets 284% per annum interest; what length of time does the note run?

114. A speculator bought a number of doubtful notes at a discount of 25%, brokerage $1\frac{3}{8}\%$; notes amounting to \$225 proved worthless, but by selling the rest at 95%, brokerage $1\frac{1}{8}\%$, he gained \$188.78 $\frac{1}{8}$; what amount of notes was bought?

115. A house 36 ft. square has a hip roof $\frac{1}{4}$ pitch which projects 1 ft. beyond the walls. What is the distance from one corner of the roof to the top?

Note.—A roof is $\frac{1}{4}$ pitch when the rise of the roof is half the width of the building; $\frac{1}{2}$ pitch, when $\frac{1}{2}$ the width, etc.

116. A field in the form of a trapezoid 64 rd. long, has its ends 56 $\frac{1}{4}$ rd. and 37 $\frac{1}{4}$ rd. respectively. It was sold at \$62 $\frac{1}{4}$ an acre. The buyer having no money borrowed the necessary sum at a bank for 75 da., discount 7 $\frac{1}{4}\%$. Find the face of the note.

117. The surface of a rectangular block contains 12 sq. yd. Each end forms a square whose diagonal is 4.24264 ft. Find the length of the diagonal of the block.

118. A manufacturer in Antwerp sells Brussels carpet to a jobber in New York at 22 ct. a yd. at a profit of 10%; the jobber pays freight 1 ct. a yd., duty 44 ct. per sq. yd. and 40% ad valorem, and sells at a profit of 12 $\frac{1}{2}\%$ to the retailer who sells at a profit of 20%; what per cent above first cost does the retail purchaser pay?

119. Find the cost of shingles and nails required to roof a barn 60 ft. long and 40 ft. wide, the roof being $\frac{3}{4}$ pitch and projecting 18 in. at the eaves, allowing 1000 shingles to each 120 sq. ft., and 6 lb. nails to each 1000 shingles; shingles costing \$2.75 per M and nails 4 $\frac{1}{2}$ ct. a lb.

120. A flag-pole in a public square is made of 4 pieces; the length of the third equals $\frac{1}{2}$ of the second, which is $5\frac{1}{2}$ times the fourth, which is $\frac{1}{4}$ of 5 ft. less than the first; find the length of each piece.

121. If a merchant's gain at retail is $33\frac{1}{3}\%$, and he sells at wholesale at 10% and 5% off from retail price, what is his gain at wholesale?

122. If 125 lb. of sea-water contain 5 lb. of salt, how much salt must be added so that 85 lb. will contain 10 lb. of salt?

123. A can mow 2 acres in 3 days; B, 5 acres in 6 da.; and C 4 acres in 5 da.; how long will it take D, who is an average hand, to mow as much as C can mow in $5\frac{1}{2}$ da.?

124. M sold 14 sheep and 17 hogs for \$218; he sold again at the same rates 19 sheep and 28 hogs for \$288.50; what was the price of each?

125. The profits from a business for a time were \$768. A put in \$600, for a time and received as profit \$189; B put in a sum for 10 mo. and received \$280; and C put in \$700. Find A's and C's time and B's capital.

126. Find the triangular space between three circles whose edges touch, each of which is 20 ft. in diameter.

127. Find the area of a rectangular field whose perimeter is $\frac{7}{11}$ mi., and whose length is $\frac{1}{2}$ of its breadth.

128. Twelve potatoes are placed in a line 6 ft. apart, the first 6 ft. from a basket; how far will a boy travel who gathers them singly and places them in the basket?

129. I bought 4 lb. coffee, 22 lb. sugar, and 5 lb. tea for \$8.92; again, of the same 8 lb. coffee, 16 lb. sugar, and 7 lb. tea for \$5.25; and of the same again, 5 lb. coffee, 30 lb. sugar, and 4 lb. tea for \$4.25; what was the price of each per lb.?

130. A tenant rents a piece of ground to put in potatoes agreeing to deliver $\frac{1}{3}$ of the crop for rent, but when digging time came the tenant, unable to dig them, offered $\frac{1}{4}$ of the whole crop for digging them, which the landlord accepted but quit when he had dug his own and his pay for digging; what part of the whole crop did the landlord dig?

131. What is the longest strip of carpet a yd. wide that can be laid straight on the floor of a room 24 ft. square?

132. From 2 mi. 2 ft. and 10 in. subtract 1 mi. 7 fur. 89 rd. 5 yd. 2 ft. 11 in., without reducing to in.

133. If the cost had been 12% less, the gain would have been 18% greater; what was the rate of gain?

Solution.—The second cost is 100% less 12% = 88% of the first cost. If on 100% the amount is a certain rate, on 1% the rate will be 100 times as great, and on 88% it will be $\frac{1}{88}$ of 100, or $\frac{100}{88}$ times as great; hence $\frac{100}{88} - \frac{88}{88} = \frac{12}{88} = 18\%$, the difference in the rate, and $\frac{88}{88} = 182\%$ the rate at first cost; hence the gain was 82%

134. Bought of Young Bros. & Maris Co., Jan. 5, a bill of \$800 on 5 mo. credit; Jan. 20, \$300 on 5 mo.; Feb. 12, \$500 on 4 mo.; and Mar. 16, \$400 on 3 mo.; what is the average term of credit and the equated time for the payment of the whole bill?

135. What is the balance of the following account and when is it due?

Dr.			W. T. J. Cooper			Cr.		
1894						1894		
Jan. 10	To Mdse. on 3 mo.	\$800	Mar. 22	By Cash	\$450			
Feb. 20	“ “ “ 3 mo.	\$600	Apr. 1 -	“ “	\$300			
Mar. 16	“ “ “ 3 mo.	\$550	Apr. 26	“ “	\$650			

136. How much roofing is required for a building 82 ft. by 40 ft., the roof $\frac{1}{4}$ pitch and projecting 18 in. at the eaves?

137. If corn planted 3 ft. 8 in. apart produce $6\frac{1}{2}$ bu. to each row $\frac{1}{4}$ mi. long, what is the yield per acre?

138. What is the yield per acre, of potatoes planted in rows 8 ft. apart, if each row 12 rd. long yields $2\frac{1}{2}$ bu.?

139. The square of the sum of two numbers which are to each other as 4 to $2\frac{1}{4}$ is 22500; what are the numbers?

140. Separate 3840 into 3 factors which are to each other as $\frac{3}{8}$, $\frac{1}{2}$, and $\frac{5}{8}$.

141. A bought a farm for \$12000 agreeing to pay principal and interest in 6 equal annual payments. How much did he pay each year, interest 6%?

142. A body falls in a vacuum 16 ft. 1 in. the first second; the next second 3 times that distance; the third 5 times that distance, etc.; what distance would it fall in 40 sec.?

143. A cistern has 4 pipes; the first can fill it in $\frac{1}{2}$ hr., and the second in 20 min.; the third can empty it in 24 min., and the fourth in one hr. If all the pipes are opened at 20 min. past 2 P. M., the cistern being empty, at what time will it be filled?

144. What is the value in currency of 7984 oz. of silver bullion at \$19.80 per pound when gold is selling at 102 $\frac{1}{2}$?

145. A Virginia creeper winds spirally around a pole, 6 in. in diameter and 80 ft. high, $\frac{3}{4}$ of the way up; if the vine goes round the pole once every 10 in., how long is the vine?

146. A tree 84 ft. high was broken and hangs to the stump with the top resting on the ground 28 ft. from the root; how high was the tree broken?

147. A ball whose diameter is 10 in. contains enough yarn for 4 pairs of stockings; how much of the diameter will be wound off in knitting each pair?

148. What is the cost, at \$15 per M, of siding for a barn 48 ft. wide, in shape of an L, the length each way being 80 ft., the height to the square 18 ft., and the roof $\frac{1}{2}$ pitch?

149. A rope is drawn from the top of a pole standing perpendicular, at the water's edge on the bank of a river, to the nearest point on the opposite side of the stream. The distance from the middle of the rope to the water is 27 ft., and from the middle of the rope to the foot of the pole 45 ft. Find the length of the rope.

150. If an article had cost 20% more, the gain would have been 25% less; what was the gain per cent.?

151. Two men start together for a fort. One, who travels 14 mi. an hr., after traveling $8\frac{1}{2}$ hr., turns back as far as the other had traveled during those $8\frac{1}{2}$ hr. He then turns and pursues his way toward the fort, when both arrive together, 17 hr. from the time they set out. At what rate did the other travel and how far?

152. If the cost had been $16\frac{2}{3}\%$ less the loss would have been $15\frac{1}{4}\%$ less; what was the loss per cent.?

153. A lot was sold at a gain of $16\frac{2}{3}\%$, but had it cost \$160 less, the gain would have been $14\frac{7}{12}\%$ more; what did the lot cost?

154. A steamer going from Philadelphia to Liverpool passes over $8\frac{1}{2}$ degrees of longitude on an average in a day; how long is it from noon one day to noon the next day, and how long will it be on the return?

155. Four masons having built a house, received a certain sum which was divided as follows: The first received

\$270.27 and $\frac{1}{18}$ of the remainder; the second \$300.30 and $\frac{1}{18}$ of the remainder; the third \$330.33 and $\frac{1}{18}$ of the remainder; and the fourth what was left, when it was found that each had received the same; what was the amount of their wages?

156. A man's will disposed of an estate worth \$88400 as follows: to the wife $\frac{1}{3}$ of the estate, to the daughter $\frac{2}{3}$ of the remainder, and to the son the balance; if the widow die what is the share of the son and daughter each?

157. Three equal circles, with edges touching, enclose a triangular space containing 6.296875 sq. ft.; what is the diameter of each circle?

158. In turning a hayrake within a circle, it is observed that the outer wheel makes three turns while the inner makes but two; the wheels are each 5 ft. high, and the axle-tree 10 ft. long; how many revolutions does the outer wheel make in completing the circle?

159. A figure whose opposite angles equal two right angles has for its sides a length of 32 ft., 18 ft., 24 ft., and 10 ft. respectively; what is its area?

160. B sold his mill and store for a certain sum, receiving $\frac{2}{3}$ as much for the store as for the mill; on the store he gained 5% and on the mill he lost 16%; his whole loss was \$1900; what was the cost of each?

161. On $\frac{3}{4}$ of my investment I lost 5% and on the balance I gained 15%; had I gained 15% on the $\frac{3}{4}$ and lost 5% on the balance my gain would have been \$400 more; what was my whole investment?

162. A commission merchant sold flour at 5% com. and invested the proceeds in sugar at 5% com.; the com. on the flour was \$69.50 more than the com. on the sugar; what was the value of each?

ANSWERS.

Pages 9 to 12.—1. 2338; 2. 2969; 3. \$2540; 4. 2489; 5. 27710; 6. 30353; 7. 2813; 8. 3326; 9. 1348476; 10. \$88.319; 11. 2364696; 12. \$3630.26; 13. 12427; 14. 786963; 15. 14435; 16. \$1313.67; 17. 1140251; 18. 148625451; 19. 37376; 20. 384041; 21. \$139811; 22. 14283; 23. 3495; 24. 91370; 25. 77610; 26. 1112209; 27. 1466985; 28. 333; 29. 312; 30. 663; 31. 654; 32. 660; 33. 579; 34. 594; 35. 615; 36. 739; 37. 1062; 38. 1034; 39. 826; 40. 949; 41. 821; 42. 711.

Page 13.—1. 543; 2. 525; 3. 5512; 4. \$5339; 5. 24912; 6. 49290; 7. 30449; 8. 288455; 9. 3246; 10. \$2715.59; 11. 84608559; 12. 28954232; 13. 266767; 14. 275107; 15. 394184; 16. 10936033; 17. 677451; 18. 21613; 19. 226614; 20. 1175339; 21. \$267.64; 22. \$866.67; 23. \$178.05.

Pages 14 and 15.—1. \$774825; 2. \$2794.01; 3. 10090; 4. 74006; 5. 1243889; 6. 46022885; 7. \$1032.95; 8. 1699974; 9. 2804; 10. 496988944998; 11. 147593; 12. 39817266; 13. 255 da.; 14. 615772; 15. 930; 16. \$12834; 17. 1899—2975; 18. 641; 19. 958095; 20. 18954132; 21. 16933; 22. \$41875; 23. \$150540; 24. 864197532; 25. \$417—\$562; 26. 11750; 27. 41.

Pages 16 and 17.—1. 23462375 — 164236625 — 1295123100—1773755550—4626780350; 2. \$39368546—\$359940992—\$2429601696—\$551159644—\$11293148624; 3. 575166942—3387094214—41348112386—45182558666—63076641306; 4. \$15469.50—\$201103.50—\$889496.25—\$2294642.50—\$15490126; 5. 7731063—73874602—647691278—2599355182—34961584900; 6. 78992000—888660000—3653380000—7504240000—96607216000;

7. 135713646—369442703—7320997237—14265012124—362378053761; 8. 451818982968—5634182622042—590734439388; 9. 1134800—567400—283700—3404400—11348000; 10. 947860—9478600—18957200—94786000—14217900; 11. 42802500—5707000—2140250—29961750—171210000.

Page 18.—1. 693440—1016064—564480—725760—635040—211680—52920—5880; 2. 274482—320229—213486—147798—83538—21114—4914—2737; 3. 1056832—1207808—603904—150976—37744—9436—4718; 4. 1271601—989023—387009—43001—55287—6143—1449; 5. 1414512—442035—71440—7920—2640—440; 6. 10878525—1208725—310815—172675—7875; 7. 7008—2475; 8. $144\frac{1}{10}$ — $584\frac{1}{10}$ — $4\frac{1}{10}$; 9. $380\frac{1}{10}$ —1868; 10. 4438—2219—1268—951—634—252; 11. 15120—12096—3024—2520—840—720; 12. 41472—27648—10368—5184—1728; 13. 1279200—255840—170560—85280—102336—95940; 14. 470400—47040—15680—9408—6720—117600; 15. 7564950—756495—756491—1512990—151299—100866; 16. 507; 17. 244; 18. 300; 19. 470; 20. 1476.

Pages 18 to 23.—1. 41706720—41844000—131466720; 2. 137280; 3. 908; 4. 909; 5. 167; 6. 102706; 7. 36 +; 8. 1092; 9. 5120780; 10. 53; 11. 662704; 12. 1695573; 13. 202287; 14. \$185; 15. \$58570; 16. \$1435; 17. \$23770; 18. 9 yr.; 19. \$2510.50; 20. 43046721; 21. 3186696; 22. \$233410; 23. \$149.76; 24. 309349; 25. 5040; 26. 6906457; 27. 257; 28. 18—31; 29. \$22398 gain; 30. \$36.50; 31. 1384; 32. 60 hr.; 33. 741 da.; 34. \$1; 36. \$35950; 37. $55\frac{1}{2}$ hr.; 38. \$94; 40. $8\frac{1}{2}$ yr.; 41. \$432; 42. 180 sheep; 43. \$229.30 gain; 44. 13 ducks—26 turkeys—117 chickens; 45. 21 h.—240 q.—240 d.; 46. \$254.40 g.; 47. 12 midnight—456 mi.; 48. 540; 49. 13; 50. 105; 51. 183344.

Pages 24 to 28.—**15.** 11, 13; **16.** 5, 7, 11; **17.** 3, 5, 7, 13; **18.** 2, 2, 3, 3, 5, 7; **19.** 8 2's; **20.** 2, 2, 2, 3, 7; **21.** 5 2's, 37; **22.** 2, 2, 3, 3, 3, 7; **23.** 2, 3, 5, 7, 13; **24.** 6 2's, 3 3's; **25.** 2, 3, 3, 5, 5, 7; **26.** 3, 3, 11, 11; **27.** 3, 3, 5, 7, 11; **28.** 29, 37; **29.** 31, 47; **30.** 97, 113; **31.** 7, 11, 11, 11; **32.** 7, 7, 107; **33.** 4 2's, 23, 43; **34.** 11, 13, 17, 17; **35.** 4—10—16—18—25—33—42—77; **36.** 3—5—6—8—12—16—21; **39.** 18—18—24; **40.** 9, 27; **41.** 1043; **42.** 101—1013; **43.** 6; **44.** 105; **45.** 84; **46.** 118; **47.** 16; **48.** 13; **49.** 73; **50.** 5; **51.** 336; **52.** 1008; **53.** 216; **54.** 1260; **55.** 290177; **56.** 18480; **57.** 12 g. c. d.—360 l. c. m.—46 g. c. d.—17710 l. c. m.—73 g. c. d.—30660 l. c. m.; **58.** 126; **59.** 165—840; **60.** 19901; **61.** 61; **62.** 9; **63.** 67½; **64.** 75; **65.** 8½; **66.** 4; **67.** 7½; **68.** 26 ch.; **69.** 150 bbl.; **70.** 24 bu.; **71.** \$16.56; **72.** 260 bu.; **73.** \$4200; **74.** 29 f.—70 a.; **75.** 360 a.; **76.** 120 rd.; **77.** 73 ft.—\$10730; **78.** 60 da.; **79.** 10—15; **80.** 22—33; **81.** 35—70—105—210—385—770—1155; **82.** 7; **83.** 1 p.m.—J 20—W 18—H 24; **84.** \$5040; **85.** 182 bu.—16 bins; **86.** 60 wk.; **87.** 3 mi.; **88.** 617 or 618; **89.** 15 min.; **90.** 10 ft.—1504 rails; **91.** 221—377; **93.** 85·ft. 3 in.; **94.** 629—323.

Pages 29 to 38.—**1.** $\frac{1}{3}$; **2.** $\frac{5}{4}$; **3.** $\frac{8}{11}$; **4.** $\frac{41}{17}$; **5.** $\frac{22}{13}$; **6.** $\frac{32833}{48}$; **7.** $\frac{1224}{5}$; **8.** $\frac{347}{13}$; **9.** $\frac{575}{16}$; **10.** $\frac{1872}{13}$; **11.** $\frac{2253}{8}$; **12.** $\frac{24050}{13}$; **13.** $\frac{68027}{1000}$; **14.** $\frac{164352}{450}$; **15.** $\frac{17220}{17}$; **16.** $\frac{40856}{123}$; **17.** $\frac{5184}{350}$; **18.** $\frac{6912}{221}$; **19.** $\frac{1301}{9}$; **20.** $\frac{110288}{473}$; **21.** 5; **22.** $35\frac{2}{3}$; **23.** $6\frac{7}{8}$; **24.** $53\frac{1}{18}$; **25.** $100\frac{2}{100}$; **26.** $59\frac{2}{41}$; **27.** $31\frac{1}{11}$; **28.** $7\frac{5}{13}$; **29.** $19\frac{1}{4}$; **30.** $40\frac{2}{31}$; **31.** $19\frac{1}{2}$; **32.** $19\frac{1}{11}$; **33.** $24\frac{2}{30}$; **34.** 89; **35.** $42\frac{2}{5}$; **36.** $29\frac{1}{11}$; **37.** $2\frac{55}{1007}$; **38.** $205\frac{1}{4}$; **39.** 92; **40.** 27; **41.** $\frac{3}{4}$; **42.** $\frac{3}{10}$; **43.** $\frac{3}{4}$; **44.** $\frac{3}{10}$; **45.** $\frac{1}{12}$; **46.** $\frac{3}{11}$; **47.** $\frac{1}{11}$; **48.** $\frac{1}{11}$; **49.** $\frac{1}{11}$; **50.** $\frac{1}{11}$; **51.** $\frac{1}{11}$; **52.** $\frac{1}{11}$; **53.** $\frac{1}{11}$; **54.** $\frac{3}{4}$; **55.** $\frac{3}{4}$; **56.** $\frac{1}{11}$; **57.** $\frac{1}{11}$; **58.** $\frac{1}{11}$; **59.** $\frac{3}{4}$; **60.** $\frac{1}{11}$; **61.** $\frac{3}{4}$; **62.** $\frac{5}{11}$; **63.** $\frac{1}{11}$;

64. $\frac{1}{2}\frac{1}{4}$; **65.** (30-40-45-48-50-35-27) 60ths; **66.** $145\frac{13}{14}$; **67.** $433\frac{1}{3}$; **68.** $\frac{1}{3}$; **69.** $\frac{1}{2}\frac{1}{4}$; **70.** $\frac{1}{4}\frac{1}{2}$; **71.** $\frac{1}{2}$; **72.** $\frac{1}{2}$; **73.** (24-20-27) 36ths; **74.** (32-21-18) 36ths; **75.** (22-17-9) 24ths; **76.** (350-301-656) 56ths; **77.** (637-7-299) 91sts; **78.** (81-66-172) 144ths; **79.** (9-108-280) 42nds; **80.** (84-171-14) 36ths; **81.** (20-15-32-110) 40ths; **82.** (140-75-252-330) 180ths; **83.** (416-1365-1534-540) 156ths; **84.** (360-2475-5984-6000) 1320ths; **85.** (384-595-7280) 560ths; **86.** (1890-200-2400-384) 240ths; **87.** (105-272-72) 72nds; **88.** (1260-1680-630-1512-2100-720-1575-1120) 2520ths; **89.** (435-540-304-264-378) 48ths; **90.** (12-10-12-3-45) 60ths; **91.** $1\frac{1}{2}$; **92.** $5\frac{1}{2}$; **93.** $12\frac{1}{2}$; **94.** $1\frac{1}{2}$; **95.** $12\frac{3}{8}$; **96.** $4\frac{1}{2}$; **97.** $1\frac{1}{2}$; **98.** $1\frac{1}{2}$; **99.** $1\frac{1}{2}$; **100.** $3\frac{1}{4}$; **101.** $16\frac{1}{2}$; **102.** $2\frac{1}{4}$; **103.** $1\frac{1}{2}$; **104.** $\frac{1}{2}$; **105.** $633\frac{1}{2}$; **106.** $1\frac{1}{2}$; **107.** $171\frac{1}{2}$; **108.** $5\frac{1}{2}$; **109.** $\frac{1}{2}$; **110.** $\frac{1}{2}$; **111.** $\frac{1}{2}$; **112.** $\frac{1}{2}$; **113.** $3\frac{1}{2}$; **114.** $5\frac{1}{2}$; **115.** $3\frac{1}{2}$; **116.** $1\frac{1}{2}$; **117.** $4\frac{1}{2}$; **118.** $19\frac{1}{2}$; **119.** $111\frac{1}{2}$; **120.** $2983\frac{1}{2}$; **121.** $61\frac{1}{2}$ - $30\frac{1}{2}$; **122.** $27\frac{1}{2}$ - $5\frac{1}{2}$; **123.** $126\frac{1}{2}$ - $67\frac{1}{2}$; **124.** $26\frac{1}{2}$ - $14\frac{1}{2}$; **125.** $3\frac{1}{2}$ - $2\frac{1}{2}$; **126.** $91-79$; **127.** $2\frac{1}{2}$ - $2\frac{1}{2}$; **128.** $\frac{1}{2}$ - $\frac{1}{2}$; **129.** $\frac{1}{2}$; **130.** $2\frac{1}{2}$; **131.** $\frac{1}{2}$; **132.** $2\frac{1}{2}$; **133.** $3\frac{1}{2}$; **134.** $15\frac{1}{2}$; **135.** $\frac{1}{2}$; **136.** $5\frac{1}{2}$; **137.** $2\frac{1}{2}$; **138.** $\frac{1}{2}$; **139.** $\$31\frac{1}{2}$; **140.** $344\frac{1}{2}$ bu.; **141.** $95\frac{1}{2}$; **142.** $68\frac{1}{2}$ yd.; **143.** $41\frac{1}{2}$ yd.; **144.** $11\frac{1}{2}$ yd.; **145.** $80\frac{1}{2}$; **146.** $183\frac{1}{2}$ a.; **147.** $116\frac{1}{2}$ cwt.; **148.** $8940\frac{1}{2}$ lb.; **149.** $\$180\frac{1}{2}$; **150.** $\frac{1}{2}$ - $\frac{1}{2}$; **151.** $\frac{1}{2}$; **152.** $\frac{1}{2}$; **153.** $\frac{1}{2}$; **154.** $\frac{1}{2}$; **155.** $67\frac{1}{2}$; **156.** $58\frac{1}{2}$; **157.** $53\frac{1}{2}$; **158.** $40\frac{1}{2}$; **159.** $19\frac{1}{2}$; **160.** $22\frac{1}{2}$; **161.** 696 ; **162.** $10\frac{1}{2}$; **163.** $501\frac{1}{2}$; **164.** $81\frac{1}{2}$; **165.** 1675 ; **166.** $208\frac{1}{2}$; **167.** $1\frac{1}{2}$; **168.** $6\frac{1}{2}$; **169.** $20\frac{1}{2}$; **170.** $72\frac{1}{2}$; **171.** $156\frac{1}{2}$; **172.** $90\frac{1}{2}$; **173.** $156\frac{1}{2}$; **174.** $\$.90\frac{1}{2}$; **175.** $\$.156\frac{1}{2}$; **176.** $\$.80\frac{1}{2}$; **177.** $\$.75\frac{1}{2}$; **178.** $\$.125\frac{1}{2}$; **179.** $\$.56.69\frac{1}{2}$; **180.** $\$.356\frac{1}{2}$; **181.** $\$.585\frac{1}{2}$; **182.** $\$.6.10\frac{1}{2}$; **183.** $\$.7\frac{1}{2}$; **184.** $\$.1.69\frac{1}{2}$; **185.** $\$.39\frac{1}{2}$; **186.** $\$.8.20\frac{1}{2}$; **187.** $\$.3\frac{1}{2}$; **188.** $\$.3\frac{1}{2}$;

189. $\frac{3}{8}$; 190. $\frac{1}{3}$; 191. $7\frac{1}{6}$; 192. $3\frac{1}{3}$; 193. 80; 194.
 32 $\frac{2}{3}$; 195. $1\frac{2}{3}$; 196. $\frac{8}{15}$; 197. $7\frac{2}{3}$; 198. $8\frac{7}{10}$; 199.
 3864; 200. 27; 201. 78; 202. $\frac{1}{7}$; 203. $1\frac{1}{8}$; 204. 2;
 205. 7; 206. $1\frac{1}{4}$; 207. $\frac{1}{8}$; 208. $\frac{3}{4}$; 209. $\frac{2}{3}$; 210.
 $\frac{1}{6}$; 211. 144; 212. $\frac{1}{44}$; 213. $1\frac{2}{3}$; 214. $\frac{8}{9}$; 215.
 $2\frac{1}{10}$; 216. $\frac{1}{80}$; 217. $\frac{1}{8}$; 218. $\frac{8}{9}$; 219. $\frac{8}{8}$; 220.
 $2\frac{7}{10}$; 221. $4\frac{1}{4}$; 222. $\frac{8}{70}$; 223. $138\frac{1}{4}$; 224. $\frac{1}{8}$; 225.
 3; 226. $\frac{1}{8}$; 227. 6; 228. $\frac{8}{15}$; 229. $\frac{8}{10}$; 230. $\frac{1}{15}$; 231.
 $\frac{3}{8}$; 232. $\frac{2}{5}$; 233. $\frac{5}{4}$; 234. $\frac{3}{8}$; 235. $\frac{2}{7}$; 236. $\frac{1}{4}$; 237.
 $\frac{1}{2}$; 238. 102; 239. 56; 240. $\frac{8}{10}$; 241. $\frac{1}{2}$; 242. $\frac{5}{8}$;
 243. $\frac{3}{8}$; 244. $\frac{3}{5}$; 245. $\frac{1}{15}$; 246. $\frac{4}{5}$; 247. $\frac{1}{15}$; 248.
 $\frac{2}{3}$; 249. $\frac{4}{5}$; 250. $\frac{7}{8}$; 251. $\frac{2}{3}$; 252. $\frac{1}{4}$; 253. $\frac{2}{5}$; 254.
 15 $\frac{1}{2}$; 255. 11; 256. 5; 257. $\frac{1}{3}$; 258. $\$1\frac{1}{2}$; 259. $58\frac{7}{10}$;
 260. $284\frac{2}{3}$; 261. $6\frac{5}{8}$; 262. $43\frac{1}{4}$; 263. $19\frac{4}{10}$; 264.
 $\frac{1}{15}$; 265. $1155\frac{7}{10}$; 266. $19\frac{1}{15}$; 267. $20\frac{5}{8}$; 268. $29\frac{3}{4}$;
 269. $\frac{1}{44}$; 270. $14\frac{3}{8}$ — $19\frac{2}{11}$; 271. $5\frac{1}{15}$; 272. 23; 273.
 $\$1.15\frac{1}{2}$; 274. $3\frac{1}{8}$; 275. $\$1814\frac{1}{4}$; 276. $\$334\frac{7}{10}$; 277.
 $12\frac{3}{4}$; 278. $23\frac{3}{4}$; 279. $\$320$; 280. $\$1135\frac{1}{2}$; 281. $\frac{3}{8}$;
 282. $46\frac{2}{15}$; 283. $\$350$; 284. $\$52.50$; 285. $\frac{3}{8}$; 286.
 88 ct.; 287. $16\frac{2}{5}$ hr.; 288. $15\frac{3}{8}$ ct.; 289. $\frac{2}{3}$ — $\$25920$;
 290. $45\frac{1}{2}$ yd.; 291. $12\frac{3}{8}$ tons; 292. $40\frac{1}{8}$; 293. $\$3\frac{1}{8}$;
 294. $\$1319\frac{1}{4}$; 295. $\$56\frac{1}{4}$; 296. $\$74\frac{3}{4}$; 297. $62\frac{1}{3}$;
 298. $\$6324\frac{5}{8}$; 299. $97\frac{1}{2}$; 300. $\$7.52\frac{1}{2}$; 301. $\frac{2}{15}$; 302.
 $\frac{8}{11}$; 303. $6\frac{3}{8}$; 304. $12\frac{1}{2}$ — $16\frac{3}{8}$; 305. $\$918$; 306. $\$3750$;
 307. Nothing; 308. $\$3240$; 309. $\$49350$; 310. 24 da.;
 311. $\frac{1}{3}$; 312. $\$768$; 313. $\$2062\frac{1}{2}$; 314. 80 ct.; 315.
 $\$152$; 316. 10 lb.; 317. 1000 books; 318. $3\frac{1}{3}$ da.;
 319. $2\frac{1}{8}$ da.; 320. $8\frac{1}{8}$ cd.; 321. 3 acres; 322. 13 da.;
 323. A $\$2.40$ —B $\$1.60$ —C $\$1.80$; 324. 490 lemons;
 325. $497\frac{1}{2}$ mi.; 326. 245 A.; 327. J 24—H 36.

Pages 39 to 45.—1. .9; 2. .43; 3. 7.34; 4. 54.645;
 5. .0003; 6. 54.41; 7. .00406; 8. 24.378; 9. 4.01; 10.
 .36 $\frac{1}{8}$; 11. .042 $\frac{3}{4}$; 12. .00005 $\frac{3}{8}$; 13. .03464; 14. 5642.734;
 15. 945.000235; 16. .0000604 $\frac{1}{3}$; 17. 400.00400;

18. 575.0575; 19. 916.1; 20. $\frac{1}{8}$; 21. $\frac{4}{5}$; 22. $\frac{1}{16}$; 23. $\frac{11}{16}$;
 24. $\frac{11}{16}$; 25. $6\frac{1}{8}$; 26. $4\frac{1}{16}$; 27. $\frac{1}{80}$; 28. $\frac{1}{8}$; 29. $\frac{1}{16}$; 30. $\frac{1}{16}$;
 31. $\frac{1}{8}$; 32. $\frac{11}{16}$; 33. $\frac{1}{16}$; 34. $\frac{3}{16}$; 35. $12\frac{1}{8}$; 36. $16\frac{3}{8}$;
 37. $27\frac{1}{16}$; 38. $6\frac{3}{16}$; 39. $7\frac{1}{16}$; 40. $85\frac{1}{16}$; 41. .75; 42.
 .875; 43. .64; 44. .1875; 45. 9.032; 46. $.08\frac{1}{8}$; 47.
 27.0125; 48. .36; 49. $4.8\frac{1}{8}$; 50. .0375; 51. .171875; 52.
 2.40625; 53. .632; 54. .0072; 55. .12; 56. 4.975; 57.
 $3.06\frac{1}{8}$; 58. 5.616; 59. 10.04; 60. \$238.26; 61. 2.9999997;
 62. 49,987545; 63. 363.8217155; 64. 10.14596; 65.
 15.4623; 66. 13.694; 67. 3.1436; 68. .119556; 69.
 .0002912; 70. .000538434; 71. 12312.5; 72. 83.125;
 73. .0167 $\frac{1}{16}$; 74. 165; 75. 561; 76. 283.655625; 77.
 .01326; 78. 63375; 79. .0000029; 80. .000224; 81.
 \$621.41625; 82. \$13300.875; 83. \$225.634375; 84. \$.81;
 85. 8.9375 sq. mi.; 86. .0003; 87. 18; 88. .00126; 89.
 .00012; 90. 14.55; 91. .00003684; 92. 400000; 93. 1.5;
 94. 5.4; 95. .00000375; 96. 43.08; 97. .000025; 98.
 .00096; 99. .08; 100. .00289; 101. \$91.8575; 102. .64;
 103. .21875; 104. .00375; 105. .006006; 106. 84.63;
 107. 169.26; 108. \$54.9815; 109. \$30.275; 110.
 \$113.15 $\frac{1}{8}$; 111. 13.06 $\frac{1}{8}$; 112. 1st. 1682.34 $\frac{1}{8}$ bu.—2nd.
 1009.40 $\frac{1}{8}$ bu.; 113. \$88.125; 114. 41.19 $\frac{1}{4}$; 115. \$95.625;
 116. \$13844; 117. \$137.75; 118. 55 $\frac{1}{4}$ times; 119.
 290576; 120. \$4195.625; 121. \$12.93 $\frac{1}{4}$; 122. A, \$240—
 B, \$1600—C, \$1400; 123. \$2083 $\frac{1}{8}$; 124. C, \$402.25—
 D, \$568—E, \$662.25; 125. A .14—C .37—W .49; 126.
 \$78.50; 127. \$22.23; 128. \$340.40; 129. \$54.27;
 130. \$3.21; 131. \$63.58; 132. \$101.40; 133. \$121.005;
 134. \$103.50; 135. \$65.97; 136. \$49.78 $\frac{1}{8}$; 137. \$90.33;
 138. \$27.52; 139. \$79.42; 140. \$24.38; 141. \$104.92;
 142. \$1077.16 $\frac{1}{4}$; 143. \$180.90; 144. \$20.64; 145.
 \$35.45; 146. \$507.80; 147. \$40.95; 148. \$89.; 149.
 \$38.25; 150. 32586 $\frac{1}{8}$ ft.; 151. 21080 rails; 152. \$6.75;
 153. \$1.12 $\frac{1}{4}$; 154. \$33.92 +; 155. 250000 lb.;

156. \$88.85; **157.** 28.873 bu.; **158.** \$3.078; **159.** \$7.51; **160.** \$482.74; **161.** \$106.75; **162.** \$762.58.

Pages 46 to 50.—**1.** 314 pt.; **2.** 6525 lb.; **3.** 15 rd. 14 ft. 8 in.; **4.** 989 far.; **5.** 159408 sq. in.; **6.** 280 quires; **7.** 248 c. 4 cu. ft. 1542 cu. in.; **8.** 16 a. 88 sq. rd.; **9.** 1040 gi.; **10.** 111 lb. 6 oz. 11 pwt. 14 gr.; **11.** 1956; **12.** 9 mi. 23 ch. 25 li.; **13.** 4000 a.; **14.** 2419200 sec.; **15.** 5073 rm. 17 qui. 20 sh.; **16.** 3120 cu. ft.; **17.** 648 doz.; **18.** 11 fath.; **19.** 3 bbl. 7 gal. 3 qt. 1 pt.; **20.** 3 wk. 5 da. 4 hr.; **21.** 13 G. gro. 7 gro. 6 doz.; **22.** 24739 yd.; **23.** $1\frac{1}{2}$ gi.; **24.** $\frac{1}{2}$ pt.; **25.** 266 rd. 3 yd. 2 ft.; **26.** 5 pwt. 15 gr.; **27.** 96 sq. rd.; **28.** 5 mo. 1 wk. 2 da. 8 hr.; **29.** 7 oz. 4 pwt.; **30.** 7 hr. 12 min.; **31.** 82 cu. ft.; **32.** 3 pk. 1 qt. 1.2 pt.; **33.** 1 wk. 2 da. 15 hr.; **34.** 150 sq. rd.; **35.** 3 cwt. 21 lb. 12.8 oz.; **36.** 3 sq. yd. 7 sq. ft. 4.6 sq. in.; **37.** 39 gal. 1 qt. 1 pt.; **38.** 4.5 gr.; **39.** 147 lb.; **40.** 20 sq. rd. 14 sq. yd. 4 sq. ft. 97.92 sq. in.; **41.** $\frac{1}{2}$; **42.** $\frac{3}{4}$; **43.** $\frac{1}{2}$; **44.** $\frac{1}{2}$; **45.** $\frac{1}{2}$; **46.** $\frac{3}{4}$; **47.** $\frac{1}{2}$; **48.** $\frac{1}{2}$; **49.** $\frac{1}{2}$; **50.** .6875; **51.** .675; **52.** .1296; **53.** .0989583; **54.** .34625; **55.** .1107142857; **56.** .30416; **57.** .2416; **58.** .140625; **59.** \$1272; **60.** 2402 lb. 8 oz.; **61.** \$8.508 —; **62.** \$1294.275; **63.** 80 jars; **64.** \$15.925; **65.** 1320 boards; **66.** $\frac{1}{2}$; **67.** 43200 times; **68.** \$14.76; **69.** 1070 $\frac{1}{2}$ rev.; **70.** \$7.; **71.** 312 lb. av.; **72.** \$71.31; **73.** 45 chains; **74.** 20 $\frac{1}{2}$ lb.; **75.** 112 bu.; **76.** \$45.33; **77.** \$32.58; **78.** 17 lots; **79.** 95 sacks; **80.** 184 bu. 2 pk. $\frac{3}{4}$ qt.; **81.** \$21.21; **82.** \$3.69; **83.** \$259.20; **84.** \$160.93; **85.** 34 $\frac{1}{2}$ bbl.; **86.** \$50.788; **87.** Feathers 1240 gr.; **88.** Silver 42 $\frac{1}{2}$ gr.; **89.** 21.045 mi.; **90.** \$12.285; **91.** 157 lb. 11 oz. 16 pwt. 16 gr.; **92.** $\frac{1}{2}$ mi.; **93.** 1 hr. 40 min.; **94.** 297 d. 14 hr. 35 min. 24 + sec.; **95.** 78° 45' W., or 69° 21' W.; **96.** \$6562.50; **97.** \$12.26; **98.** 2 d. 2 h. 30 min. 45 s.; **99.** 13° 37' 42"; **100.** 1 hr. 15 min. 56 sec.;

101. East; $71^{\circ} 15' W.$; **102.** \$252; **103.** 200 pencils; **104.** $\frac{2}{3}$; **105.** Miss B. 64—Mr. T. 62; **106.** Sun. June 17; **107.** 3:08 p.m.; **108.** 1st $19^{\circ} W.$ —2d $28^{\circ} E.$; **109.** 810 mi.; **110.** 22 min.—16 sec.—p.m.; **111.** $80^{\circ} 45' W.$

Pages 51 to 60.—**1.** 18 sq. ft.; **2.** 377 sq. ft.; **3.** 420 sq. rd.; **4.** $12\frac{2}{3}$ sq. yd.; **5.** 10032 sq. in.; **6.** $6\frac{1}{2}$ a.; **7.** 400 a.; **8.** $12\frac{1}{2}$ ft.; **9.** 61 ft.; **10.** 120 boards; **11.** $807\frac{1}{2}$ sq. ft.; **12.** $80\frac{2}{3}$ sq. ft.; **13.** 40 a.; **14.** \$1120; **15.** $435\frac{1}{2}$ ft.; **16.** 174 sq. ft.; **17.** $19\frac{1}{2}$ ft.; **18.** 11520 slates; **19.** \$51.64; **20.** \$121.975; **21.** \$44.80; **22.** 99 yd.; **23.** $202\frac{2}{3}$ yd.; **24.** $38\frac{2}{3}$ yd.; **25.** 4116 sq. ft.; **26.** 256 tulips; **27.** 48 rd.; **28.** \$291.84; **29.** \$412.80; **30.** \$299.52; **31.** \$571.095; **32.** \$83.265; **33.** \$56.304; **34.** \$76.80; **35.** $5\frac{1}{11}$ acres; **36.** \$61.60; **37.** $65\frac{1}{11}$ yd.; **38.** \$61.42; **39.** \$2016.67; **40.** 20 rolls; **41.** \$20.15; **42.** \$60.16; **43.** \$88; **44.** \$33.60; **45.** 46 rolls ($\frac{1}{2}$ left); **46.** 9 in.; **47.** \$474; **48.** \$8.72; **49.** 12 cu. yd. 19 cu. ft.; **50.** 5 ft.; **51.** \$232; **52.** 14.4 min.; **53.** $31\frac{1}{2}$ cd.; **54.** 22 ft.; **55.** \$21.27; **56.** $10\frac{2}{3}$ ft.; **57.** 945 ft.; **58.** $1194\frac{3}{4}$ ft.; **59.** \$15.60; **60.** $13\frac{1}{2}$ ft.; **61.** $5\frac{3}{4}$ ft.; **62.** \$5.25; **63.** \$144; **64.** \$902.52; **65.** \$4.29; **66.** \$874; **67.** $92\frac{1}{8}$ ft.; **68.** $1393\frac{1}{2}$ ft.; **69.** \$173.56; **70.** \$277.40; **71.** \$302.14; **72.** \$64.80; **73.** \$241.69; **74.** \$28512; **75.** 36 ft.; **76.** \$191571.60; **77.** \$21.17; **78.** 300 ft. sq.; **79.** \$739.20; **80.** \$343.27; **81.** 520600 bricks; **82.** \$774.58; **83.** 1239 bricks; **84.** $61747\frac{1}{2}$ bricks; **85.** $253.5\frac{5}{8}$ perches; **86.** 25 ft. $3\frac{1}{2}$ in.; **87.** $359\frac{5}{7}$ gal.; **88.** $897\frac{1}{4}$ gal.; **89.** $79\frac{1}{4}$ gal.; **90.** $99\frac{1}{7}$ gal.; **91.** $95\frac{2}{3}\frac{1}{3}$ bbl.; **92.** 1645 $\frac{1}{2}$ bu.; **93.** $13\frac{1}{11}$ gal.; **94.** \$76.94; **95.** 6 ft. $\frac{3}{8}$ in.; **96.** 540 bu.; **97.** 9 ft. 4 in.; **98.** \$144.64; **99.** 12 ft. $1\frac{1}{2}$ in.; **100.** $438\frac{2}{3}$ tons; **101.** $59\frac{1}{3}\frac{1}{3}$ bbl.; **102.** $482\frac{1}{2}$ bu.; **103.** 297.432 bu.; **104.** \$368.64; **105.** \$1630.40; **106.** 27 pens; **107.** \$179.21; **108.** 1.87 + in.; **109.** 45.15 + bbl.; **110.** 632 — cu. in.; **111.** $11\frac{2}{3}\frac{2}{3}$ in.; **112.** 25641 + sq. ft.; **113.** \$315.40.

Pages 61 to 65.—**1.** 14.7; **2.** 256; **3.** \$7.65; **4.** \$32.50; **5.** \$201.60; **6.** 60 bu.—62½ bu.—83½ bu.; **7.** 120 sheep—125 sheep—500 sheep; **8.** \$325.60—\$330—\$550; **9.** \$1036.80—\$1040—\$180; **10.** 333 lb.—1332 lb.—83.25 lb.; **11.** 45; **12.** \$16.80; **13.** 89.2 ft.; **14.** 986.8 lb.; **15.** \$528; **16.** .0516; **17.** 33.975; **18.** .007; **19.** 3600 oz.; **20.** $\frac{3}{4}$ ct.; **21.** 210 yd.; **22.** 81 oz.; **23.** 900.2 in.; **24.** 758.5 gal.; **25.** 294 mi.; **26.** $13\frac{1}{8}$ yd.; **27.** 1.275 ft.; **28.** .0007 pt.; **29.** 768 ft.; **30.** 8.1; **31.** 96; **32.** \$201; **33.** \$618; **34.** \$70; **35.** \$137.73; **36.** \$112.25; **37.** 7.8375 t.; **38.** 5 lb. 8 oz. 18.7 pwt.; **39.** 22.8; **40.** \$800; **41.** \$822.50; **42.** \$50; **43.** The latter \$30; **44.** \$1125; **45.** 2678½ lb.; **46.** 100; **47.** 400; **48.** 5—500; **49.** \$70—\$7000; **50.** \$1446.40—\$723.20; **51.** 9720; **52.** 75 %; **53.** 40 %; **54.** $16\frac{2}{3}$ %; **55.** $66\frac{2}{3}$ %; **56.** 95.5 + %; **57.** $111\frac{1}{3}$ %; **58.** $12\frac{1}{2}$ %; **59.** $112\frac{1}{2}$ %; **60.** $31\frac{1}{4}$ %; **61.** 40 %; **62.** $83\frac{1}{3}$ %; **63.** $6\frac{1}{4}$ %; **64.** $13\frac{1}{2}$ %; **65.** $106\frac{2}{3}$ %; **66.** $7\frac{1}{2}$ %; **67.** $8\frac{1}{2}$ %; **68.** 75 %; **69.** $82\frac{1}{2}$ %; **70.** $18\frac{2}{3}$ %; **71.** 20 %; **72.** $12\frac{1}{2}$ %; **73.** 30 %; **74.** $6\frac{1}{4}$ %; **75.** $19\frac{2}{3}$ %; **76.** 12250; **77.** 1 gal.; **78.** 560 lb.; **79.** 360; **80.** \$1500; **81.** 1056 yd.; **82.** \$1; **83.** 5 gal.; **84.** $341\frac{1}{2}$; **85.** \$3606; **86.** 1400; **87.** $3\frac{1}{8}$ lb.; **88.** 312; **89.** \$52; **90.** \$1000; **91.** 1 mi.; **92.** \$4800; **93.** 80 ct.; **94.** 123; **95.** $\frac{4}{7}$; **96.** $\frac{1}{2}$; **97.** 92; **98.** 470.4; **99.** $59\frac{1}{7}$; **100.** 150—183½; **101.** $12\frac{1}{3}$ — $15\frac{3}{11}$; **102.** 500 ft.; **103.** 250; **104.** 224; **105.** $\frac{5}{8}$; **106.** $\frac{1}{4}$; **107.** $28\frac{1}{2}$; **108.** $20\frac{1}{2}$; **109.** 9 lb. 6 oz.; **110.** $\frac{2}{3}$ yd.; **111.** $13\frac{1}{8}$; **112.** 50 %; **113.** $17\frac{1}{2}$; **114.** 512 a. 64 p.; **115.** 5 lb. 7 oz. 1 pwt.; **116.** \$2000; **117.** 240; **118.** 120; **119.** $83\frac{1}{3}$ %; **120.** $37\frac{1}{2}$ %; **121.** $257\frac{1}{4}$ lb.; **122.** A, \$3420—B, \$3032; **123.** $97\frac{3}{8}$ %; **124.** \$4800; **125.** $83\frac{1}{3}$ %; **126.** \$24060; **127.** \$300; **128.** \$1500; **129.** \$273.60 s. — \$410.40 c. g. — \$684 fl. — \$912 fr.; **130.** $12\frac{1}{2}$ %; **131.** \$1515; **132.** \$118125; **133.** \$3520;

134. \$19500; **135.** $24\frac{1}{2}\%$; **136.** $32\frac{1}{8}\%$; **137.** \$62;
138. 480 bu.; **139.** \$540; **140.** \$8 make—\$12 cloth
 —\$15 trim; **141.** $37\frac{1}{2}\%$; **142.** $79\frac{1}{2}\%$; **143.** \$20000;
144. 19200 men.

Pages 66 to 68.—**1.** \$145.80; **2.** \$50.40; **3.** \$33.60;
4. \$126; **5.** \$18.75; **6.** $12\frac{1}{2}\%$; **7.** \$7924.80; **8.** \$11.31 $\frac{1}{2}$;
9. \$44; **10.** 140 %; **11.** \$180; **12.** \$100.80; **13.** $71\frac{1}{2}\%$;
14. $84\frac{3}{8}\%$; **15.** \$7650; **16.** \$542; **17.** \$6.85 $\frac{1}{2}$; **18.** \$880;
19. \$213.75; **20.** 15 ct.; **21.** \$660; **22.** \$244; **23.**
 \$76.80; **24.** \$3411; **25.** \$5.265; **26.** $13\frac{1}{8}\%$ loss; **27.**
 \$402.192; **28.** \$16.25; **29.** $83\frac{1}{2}\%$; **30.** 50 %; **31.** \$2;
32. \$3840; **33.** $\frac{0.04}{w.ne}$; **34.** \$14400; **35.** \$12.50; **36.**
 \$1600; **37.** 11 ct., 16 $\frac{1}{2}$ ct., 33 ct., 65 $\frac{1}{2}$ ct., \$1.64; **38.**
 \$16.80; **39.** $87\frac{1}{2}$ ct.; **40.** \$4375; **41.** 25 %; **42.** \$5.22;
43. 50 %; **44.** \$120; **45.** \$20000; **46.** \$78125; **47.**
 \$800; **48.** 2 % gain.

Pages 69 to 71.—**1.** \$144—\$218.75; **2.** \$103.275;
3. \$1195.48; **4.** \$1945.30; **5.** 7500 bu.; **6.** $2\frac{1}{2}\%$; **7.**
 $3\frac{1}{2}\%$; **8.** \$2.002; **9.** \$137.94; **10.** $2\frac{1}{2}\%$; **11.** \$6.50; **12.**
 1560; **13.** \$14790; **14.** \$19285.71; **15.** 28434 $\frac{1}{4}$ lb.; **16.**
 \$9215; **17.** \$6120 corn—\$5760 flour; **18.** $3\frac{1}{2}\%$; **19.**
 \$882.35; **20.** \$16400 grains—\$738 selling—\$382 buying;
21. \$176 com.—\$3024; **22.** 26 tons; **23.** \$48; **24.**
 236.14; **25.** \$234.15; **26.** 2 %; **27.** H. \$100—C. \$50;
28. 52000 lb.; **29.** Latter \$146 $\frac{3}{4}$.

Pages 72 to 73.—**1.** \$78.84; **2.** \$8.31; **3.** \$164.65;
4. $1\frac{1}{2}\%$; **5.** \$26.25; **6.** $2\frac{1}{2}\%$; **7.** \$65.70; **8.** $3\frac{1}{2}\%$; **9.**
 $6\frac{1}{2}\%$; **10.** 5 $\frac{1}{4}$ m. on \$1; **11.** \$14004.56—\$64.45; **12.**
 \$37.50; **13.** $\frac{1}{4}\%$ higher in E.; **14.** $1\frac{1}{2}\%$; **15.** \$170; **16.**
 \$150.30; **17.** \$320; **18.** \$26850; **19.** \$3560; **20.** 1.5 %;
21. \$8068965.50—\$58634.48—\$842.40.

Pages 74 to 79.—**1.** \$15—\$21—\$27; **2.** \$81—\$108
 —\$135; **3.** \$218.75—\$281.25—\$312.50; **4.** \$226.05
 —\$267.15 — \$308.25; **5.** \$221 — \$238.68 — \$294.67;

6. \$112.50—\$150; **7.** \$398.125—\$511.875; **8.** \$601.25—\$962; **9.** \$748.125—\$1122.19; **10.** \$215.06—\$172.05; **11.** \$23.25—\$34.875—\$48.44—\$53.09—\$68.51—\$96.875—\$135.625—\$215.06—\$257.69—\$129.04; **12.** \$35.83—\$53.75—\$74.65—\$81.82—\$105.59—\$149.31—\$209.03—\$331.46—\$397.15—\$198.875; **13.** \$62.55—\$93.825—\$130.81—\$142.82—\$184.314—\$260.625—\$364.875—\$578.59—\$693.26—\$347.15; **14.** \$72.45—\$108.675—\$150.94—\$165.43—\$213.486—\$301.875—\$422.625—\$670.16—\$802.99—\$402.10; **15.** \$103.75—\$155.625—\$216.15—\$236.90—\$305.72—\$432.29—\$605.21—\$959.69—\$1149.90—\$575.81; **16.** \$1007.83; **17.** \$34817.67; **18.** \$4089.31; **19.** \$2034.74; **20.** \$1782.74; **21.** \$337.50—\$393.75—\$506.25; **22.** \$157.93—\$184.26—\$236.90; **23.** \$9.22—\$10.75—\$13.825; **24.** \$155.98—\$181.98—\$233.975; **25.** \$71.29—\$83.17—\$106.94; **26.** \$343.75; **27.** \$1968.75; **28.** \$16530.21; **29.** \$212.80; **30.** \$——; **31.** \$13.29; **32.** \$23.276; **33.** \$14.32; **34.** \$49.93; **35.** \$4.01; **36.** \$.10; **37.** \$.90; **38.** \$.73; **39.** Nothing; **40.** \$1.09; **41.** \$.71; **42.** \$.750; **43.** \$.625; **44.** \$1680; **45.** \$.750; **46.** \$5000; **47.** \$.9600; **48.** \$.2530; **49.** 7%; **50.** $4\frac{1}{2}\%$; **51.** $6\frac{1}{4}\%$; **52.** 5%; **53.** $7\frac{1}{2}\%$; **54.** 7%; **55.** \$1750— $6\frac{1}{2}\%$; **56.** 1 yr. 10 m. 12 d.; **57.** 2 yr. 3 m. 6 d.; **58.** 4 y. 5 m. 9 d.; **59.** 3 yr. 4 m. 15 d.; **60.** 4 yr. 5 m. 20 d.; **61.** 20 yr.— $16\frac{2}{3}$ yr.— $14\frac{2}{3}$ yr.; 8 yr.; **62.** 40 yr.—50 yr.; **63.** \$2472— $7\frac{1}{2}\%$; **64.** Int. \$176.40; **65.** Prin. \$1880; **66.** Int. \$56.25; **67.** Int. \$199.92; **68.** Int. \$34.913; **69.** Prin. \$625.25; **70.** 3 yr. 4 m.; **71.** 6%; **72.** Prin. \$106.80; **73.** $5\frac{1}{4}\%$; **74.** Prin. \$1350; **75.** Int. \$38.06; **76.** 5 y. 4 m. 16 d.; **77.** 6%; **78.** Prin. \$7777; **79.** Prin. \$1821.50; **80.** 1 yr. 3 mo.; **81.** Prin. \$1300; **82.** \$5100; **83.** \$1009.28; **84.** \$226.10; **85.** \$3429.16; **86.** \$1494.30; **87.** \$324.49; **88.** \$11865; **89.** \$1024.88; **90.** \$15181.60; **91.** \$2694.26; **92.** \$5458.20;

93. \$734.53; **94.** \$454.38; **95.** \$272.08; **96.** \$596.19;
97. \$2656.95; **98.** \$107.24; **99.** \$7659.08; **100.** \$1552.24.

Pages 80 to 83.—**1.** \$912.70 P. W.—\$237.30 Dis.;
2. \$750—\$60; **3.** \$800—\$144; **4.** \$825—\$92.40; **5.**
 \$1500—\$180; **6.** \$1589.29—\$310.71; **7.** \$122.95—\$2.05;
8. \$13422.82—\$1577.18; **9.** \$1152—\$44.80; **10.**
 \$11076.92—\$1523.08; **11.** \$375; **12.** \$1799.90; **13.**
 \$560; **14.** \$9.03; **15.** \$1526.28; **16.** The latter 10 ct.;
17. Cash, \$2.50; **18.** \$447.87; **19.** \$25.84; **20.** The
 latter \$81.66; **21.** \$4.20—\$395.80; **22.** \$9.95—\$540.05;
23. \$3.32—\$721.68; **24.** \$11.64—\$739.26; **25.** \$88.15—
 \$3136.85; **26.** \$13.63—\$582.17; **27.** \$58.44—\$2691.56;
28. \$48.30—\$1827.45; **29.** \$113.75—\$9886.25; **30.**
 \$.72—\$39.28; **31.** \$126.33; **32.** \$397.18; **33.** \$504.63;
34. \$465.52; **35.** \$1659.03; **36.** July 3—\$24.50—
 \$2075.50; **37.** May 4—\$14.75—\$666.15; **38.** Sept. 8—
 \$7.14—\$458.61; **39.** \$11814; **40.** \$1500; **41.** \$2868.41;
42. \$642.92; **43.** Apr. 8—46 da.—\$1799.51; **44.** July
 18—\$305.52; **45.** \$2.17; **46.** 60 da.; **47.** 45 da.; **48.** May
 12; **49.** \$1200; **50.** 95 da.—\$11211.64; **51.** \$1090; **52.**
 \$108.02 Loss; **53.** \$57.51; **54.** \$7.50, Former; **55.** \$550.

Pages 84 and 85.—Insurance: **1.** \$14.25; **2.**
 \$1603.125; **3.** $1\frac{1}{2}\%$; **4.** \$3450; **5.** \$26312.50; **6.** \$22400;
7. \$23460; **8.** \$607.50; **9.** \$78 $\frac{1}{2}$; **10.** \$48970; **11.** $\frac{2}{3}$; **12.**
 \$7200; **13.** \$28000; **14.** \$37725; **15.** \$75000; **16.** \$27.50;
17. B, \$9000—S, \$13500; **18.** \$53000; **19.** \$925.93—
 \$740.74—\$555.555—\$555.555—\$370.37 Six Co's.

Pages 86 to 89.—**1.** \$48825; **2.** \$20767.50; **3.** 1100
 sh.; **4.** \$6205; **5.** \$8328.125; **6.** 760 sh.; **7.** 80 sh.; **8.**
 \$2700; **9.** 248 sh.; **10.** $1\frac{1}{2}\%$; **11.** $3\frac{3}{8}\%$; **12.** \$16593.75;
13. 80—66 $\frac{2}{3}$; **14.** \$606.10; **15.** A. Ex. \$100; **16.** \$704;
17. $7\frac{1}{2}\%$; **18.** \$7567.875; **19.** 6% at 150— $\frac{1}{4}\%$ better;
20. $4\frac{1}{2}\%$; **21.** \$800; **22.** 56 sh.; **23.** \$1555 $\frac{1}{2}$; **24.**
 \$22.50; **25.** 115 sh.—\$33 $\frac{3}{8}$ left; **26.** \$1437.50; **27.**

#432; 28. 10 %; **29.** $12\frac{2}{3}$ %; **30.** \$14500; **31.** $5\frac{2}{101}$ %; **32.** C. & A. \$28; **33.** 95 %; **34.** 70 %; **35.** Man. \$13860—Am. Ex. \$16537.50— $5\frac{1}{3}$ % nearly; **36.** $4\frac{1}{11}$ %.

Pages 89 to 93.—Exchange: **1.** \$603; **2.** \$956.40; **3.** \$1894.725; **4.** \$9471.825; **5.** \$4461.94; **6.** \$3768.19; **7.** \$448.82; **8.** \$4773.61; **9.** \$17669.06; **10.** \$8773.45; **11.** \$2404.20; **12.** \$3354.96; **13.** \$5000; **14.** \$4376; **15.** \$8416; **16.** \$9872; **17.** \$5284; **18.** \$4400; **19.** \$3480; **20.** \$9896; **21.** \$2824; **22.** \$8400; **23.** \$4461.75; **24.** \$1166.10; **25.** \$1730; **26.** \$1342.32; **27.** \$2195.20; **28.** \$1583.95; **29.** \$407.80; **30.** \$2661.53; **31.** \$1649.18; **32.** \$1771; **33.** \$2484.47; **34.** \$2400; **35.** \$69.88—\$28020.30; **36.** \$2155.38; **37.** \$3571.20; **38.** $\frac{1}{8}$ % prem.; **39.** \$8575.10; **40.** \$1725.24; **41.** \$1567.05; **42.** \$2704.50; **43.** £650 5s.; **44.** 7280 fr.; **45.** 750 fl.; **46.** \$3579.94; **47.** 9012.5 fr.; **48.** 4800 guilders; **49.** \$5.76 First; **50.** \$6152.17; **51.** £11076923 1s. 6d.; **52.** \$238.35; **53.** \$266.14.

Pages 92 and 93.—**1.** \$2880; **2.** \$2454; **3.** \$4480; **4.** \$900; **5.** \$2115; **6.** 80¢ per yd.; **7.** 40 %; **8.** \$3511.72; **9.** \$3757.50; **10.** \$1946.16; **11.** \$1627; **12.** \$2565; **13.** \$41742; **14.** 95 ct.; **15.** \$1993.375; **16.** \$2452.25; **17.** \$1172.50; **18.** \$2287.30.

Pages 94 to 101.—**1.** 4; **2.** $\frac{1}{4}$; **3.** 1; **4.** 3; **5.** 2; **6.** 5; **7.** $\frac{1}{4}$; **8.** $3\frac{3}{4}$; **9.** 48; **10.** $\frac{1}{16}$; **11.** 32; **12.** 24; **13.** $\frac{1}{16}$; **14.** 32; **15.** $1\frac{1}{11}$; **16.** $\frac{1}{4}$; **17.** 28; **18.** 7; **19.** 38; **20.** 4; **21.** 53 T. 12 cwt.; **22.** 6; **23.** 9; **24.** $\frac{1}{4}$; **25.** $8\frac{1}{2}$; **26.** \$33; **27.** 52 ct.; **28.** \$72.50; **29.** \$72; **30.** \$35; **31.** \$180—\$162; **32.** \$51; **33.** 40 bales; **34.** 81 ft.; **35.** \$1760; **36.** \$14.43; **37.** \$32.50; **38.** 4416 $\frac{1}{2}$ lb.; **39.** \$620.50; **40.** 178 $\frac{1}{2}$ mi.; **41.** 117 cd.; **42.** \$788.50; **43.** 375 qt.; **44.** 18 $\frac{1}{2}$ da.; **45.** 18 men; **46.** 34 $\frac{1}{2}$ yd.; **47.** \$2720; **48.** 50 ct.; **49.** 14 m.; **50.** 51 ct.; **51.** \$3328; **52.** \$96; **53.** 12 T.; **54.** 28 da.; **55.** \$189; **56.** \$64;

57. 80 da.; **58.** \$87.50; **59.** \$25; **60.** \$640; **61.** 69 da.; **62.** 35 wk.; **63.** \$61.20; **64.** $23\frac{1}{3}$; **65.** $10\frac{1}{2}$ wk; **66.** M 4430—H 3943—C 948; **67.** S \$21—J \$15.75—B \$26.25; **68.** 1st \$21.15—2d \$35.25—3d \$49.35; **69.** 936—1584; **70.** A \$156—B \$162.50—C \$124.80; **71.** 57—171—247; **72.** \$24—\$32—\$40; **73.** \$7—\$21—\$84; **74.** A's \$4080—B's \$9792—C's \$5000; **75.** C \$23264—H \$16214; **76.** 1st \$5500—2d \$4800—3d \$3800; **77.** 1st \$8400—2d \$7200—3d \$6000; **78.** L \$6540—M \$2180—O \$1635; **79.** 1st 7500—2d 6000; **80.** D 3300 bu.—E 3465 bu.; **81.** 1st 1176—2d 1386; **82.** $\frac{7}{8}$ and $\frac{1}{8}$; **83.** 28—35; **84.** H \$728—J \$1365; **85.** E \$4200—F \$2625; **86.** Oats 1650 bu.—Corn 5070 bu.; **87.** A 390 a.—B 570 a.; **88.** C 420 a.—D 220 a.; **89.** 45 banan.; **90.** \$1; **91.** \$2565; **92.** 15 da.; **93.** 75 lb.; **94.** 408 lb.; **95.** 9; **96.** 36; **97.** \$2.90; **98.** 160 bu.

Pages 102 and 103.—**1.** A \$1350—B 1650; **2.** 1st \$1200—2d \$2400—3d \$6000; **3.** C \$921.60—D \$806.40—E \$672; **4.** G's \$13600—L's \$17000; **5.** M \$8200—W \$7500—B \$4500; **6.** W \$2030—B \$2320—H 1450; **7.** A \$126—B \$105—C \$105—D \$84; **8.** J \$2490—H \$2988—K \$3984; **9.** A \$5550—B \$7770—C \$12210—D \$14430; **10.** J \$970.20—K \$529.20—L \$441—M \$705.60; **11.** A \$12—B \$19.20—C \$16.20; **12.** W \$972—L \$675—N \$567; **13.** A \$1800—B \$2400; **14.** B \$441—C \$504—D \$680; **15.** P \$2700—Q 9 mo.; **16.** A's \$4968—B's \$4700; **17.** A \$14674—B \$14776;

Pages 104 to 108.—**1.** ; **2.** 169; **3.** 1369; **4.** 11025; **5.** 213444; **6.** 531441; **7.** 9801; **8.** 20.25; **9.** $\frac{1}{4}$; **10.** 306.25; **11.** $6\frac{1}{4}$; **12.** $277\frac{1}{4}$; **13.** .015625; **14.** .000225; **15.** $32\frac{1}{4}$; **16.** 9.1809; **17.** 2197—50653—1157625—98611128—387420489—970299—91.125— $\frac{9}{7}$ —5359.375— $15\frac{1}{2}$ —4629 $\frac{1}{4}$ — $.001953125$ — $.000003375$ — $181\frac{1}{4}$ —27.818127; **18.** 243; **19.** 16807; **20.** 390625;

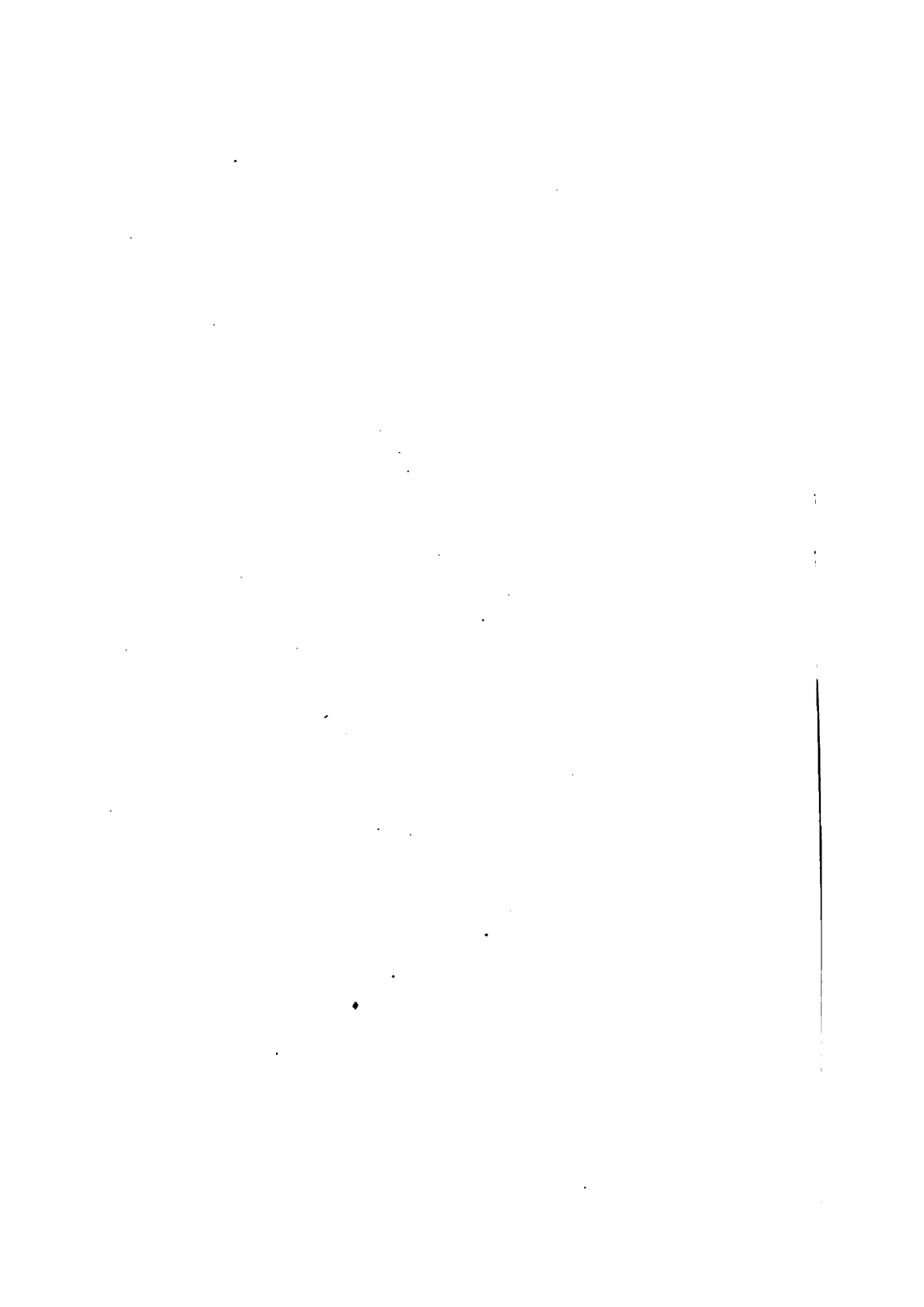
21. 11.390625; **22.** 35831808; **23.** 59049; **24.** 37515625;
25. $\frac{1}{16}$; **26.** $\frac{1}{16}$; **27.** $\frac{1}{16}$; **28.** 11390625; **29.**
 16654561; **30.** 24651225; **31.** 99980001; **32.** 5040025;
33. 3486784401; **34.** 10000000000; **35.** $24414\frac{1}{16}$; **36.**
 46656; **37.** 10th; **38.** 12th; **39.** 12th; **40.** 9; **41.** 16; **42.**
 Nothing; **43.** 3072; **44.** Nothing; **45.** 28; **46.** 5; **47.** 2;
48. 11; **49.** 6; **50.** 13; **51.** 12; **52.** 16; **53.** 34; **54.**
 135; **55.** 218; **56.** 55; **57.** 432; **58.** 1432; **59.** 14.01;
60. 997; **61.** 1.6; **62.** 5.059 +; **63.** $\frac{3}{16}$; **64.** .806 +;
65. .577 +; **66.** .707 +; **67.** 65552; **68.** 13.5; **69.**
 $107\frac{1}{8}$; **70.** .5; **71.** 38.5; **72.** 3367.98; **73.** 128; **74.**
 65 rd.; **75.** 93 rd.; **76.** $55\frac{1}{2}$ ft.— $166\frac{1}{2}$ ft; **77.** 29 rd.;
78. 13 ft.; **79.** 282.868 + rd.; **80.** $31\frac{1}{2}$ a.; **81.** 75 rd.;
82. 200 rd. l.—50 rd. w.; **83.** \$176.80; **84.** 720 mi.;
85. 60 ft.; **86.** 17.691 + ft.—20.322 + ft.; **87.** 50; **88.**
 216; **89.** 14.4; **90.** 33; **91.** $\frac{8}{9}$; **92.** $1\frac{1}{3}$; **93.** 7; **94.** 19;
95. 22; **96.** 177; **97.** 366; **98.** 157; **99.** 1596; **100.**
 497; **101.** 995; **102.** 990; **103.** 2.5; **104.** 12.3; **105.**
 13.7; **106.** $\frac{1}{16}$; **107.** $2\frac{1}{2}$; **108.** 94; **109.** 46.574; **110.**
 135; **111.** 289; **112.** 128; **113.** 2; **114.** 270; **115.** $2\frac{1}{2}$;
116. $1\frac{1}{16}$; **117.** 232; **118.** 12; **119.** 25; **120.** 32 in.;
121. 56 cu. ft.; 568 cu. in.; **122.** 48600 sq. ft.; **123.** 324
 ft.; **124.** 24.04 + in.; **125.** 58.889 + in.; **126.** 4; **127.** 4;
128. 28 ft.; **129.** 7 ft. 5.94 + in.; **130.** 10 ft. 9.07 + in.
 —11 ft. 7.04 + in.; **131.** 2197; **132.** 3; **133.** 24 cu. ft.;
134. 1 to 27; **135.** 12; **136.** 60; **137.** 36; **138.** 8;
139. 6; **140.** $1\frac{1}{2} \times 9 \times 144$.

Pages 109 to 112.—**1.** $19\frac{1}{2}$ a.; **2.** 60 rd.; **3.** \$6.30;
4. 85 rd.; **5.** 13 a. and 17.617 + sq. rd.; **6.** 156 sq. ft.; **7.**
 $16\frac{1}{2}$ a.; **8.** $8\frac{1}{16}$ a.; **9.** 40500 sq. yd.; **10.** 16 ft.; **11.** 130 rd.;
12. $22\frac{1}{2}$ a.; **13.** \$2700; **14.** 1125 sq. in.; **15.** 72 a. 71.6 +
 sq. rd.; **16.** 235.62 ft.; **17.** \$637.74; **18.** 280.11 + ft.;
19. 3 ft. 3 in.; **20.** 100.5312 ft.; **21.** 38 a. 158.84 + sq.
 rd.; **22.** 7.07 + in.; **23.** 1.414 + ft.; **24.** 44.428 + in.;

25. 565.488 sq. in.; **26.** 923.6304 sq. in.; **27.** $98\frac{3}{4}$ sq. ft.; **28.** $62\frac{3}{4}$ sq. ft.; **29.** 2 ft.; **30.** \$167.55; **31.** 638.1375 sq. ft.; **32.** 424.116 sq. ft.; **33.** 78.54 cu. ft.; **34.** 706.86 ft.; **35.** 3000 sq. ft.; **36.** $6\frac{1}{4}$ sq. ft.; **37.** 392 sq. ft.; **38.** 77440 cu. yd.; **39.** 27.6+sq. ft.; **40.** 25 ft.; **41.** 8.08+ ft.; **42.** 25 ft.; **43.** $11\frac{7}{8}$ ft.; **44.** 50,265,600 sq. mi.—268,083,200,000 cu. mi.; **45.** $2\frac{1}{4}$ ft.; **46.** 2 ft.; **47.** 120 rd.—96 rd.; **48.** 750 bbl.; **49.** \$314.16; **50.** 729; **51.** 300 loads; **52.** 56 rd.—70 rd.; **53.** \$956.08; **54.** 14.68+ in.—6.34+in.

Pages 113 to 128.—**1.** $16\frac{1}{4}$ da.; **2.** 16 yr.; **3.** \$1764; **4.** 150 gal.; **5.** 64—\$4.25; **6.** 30 doz. each; **7.** 9; **8.** $4\frac{7}{8}$ mo.; **9.** 3 mi.; **10.** .796 a.; **11.** 35; **12.** 82 rd.; **13.** $12\frac{1}{2}$ — $1\frac{1}{8}$; **14.** To sq. root; **15.** \$24.75; **16.** \$96—\$160; **17.** 4 rd.; **18.** $32\frac{3}{4}$ min. past 6; **19.** \$120; **20.** \$1482.93; **21.** 4976.2944 sq. ft.; **22.** $12\frac{1}{4}$ %; **23.** \$7.68; **24.** $17\frac{3}{4}$ da.; **25.** \$14000 J—\$17200 H; **26.** \$33; **27.** \$55; **28.** 50 ft.; **29.** 20 gal.; **30.** 8 ct.; **31.** \$175; **32.** \$2880; **33.** 1200 doz.; **34.** A \$1350—B \$900—C \$720; **35.** $48\frac{3}{8}$ %; **36.** 8 in.; **37.** 20 min. past 5; **38.** $81\frac{1}{4}$ twenty-fifths; **39.** 32—18; **40.** \$2.40; **41.** \$15; **42.** $6\frac{3}{8}$ hr.—A 10—B 15—C 8; **43.** $6\frac{1}{4}$ % loss; **44.** $6\frac{1}{4}$ ft.; **45.** 15 da.; **46.** \$56 $\frac{1}{2}$; **47.** $175\frac{1}{2}$ + lb.; **48.** 1425—950; **49.** 12000 sh.; **50.** 9 da.; **51.** 605 doz.; **52.** \$318.50; **53.** \$74.60; **54.** 328.26+ bbl.; **55.** \$52; **56.** 20 mi.; **57.** 12 h.; **58.** $36\frac{1}{8}$ min. past 4; **59.** A 12 da.—B 15 da.—C 20 da.; **60.** man 16 $\frac{3}{8}$ da.—boy 25 da.; **61.** 144; **62.** $18\frac{1}{4}$ lb.; **63.** 1st \$120—2d \$128; **64.** A \$2200—B \$6600; **65.** Cow \$90—Horse \$200; **66.** \$240; **67.** 8.584 a.; **68.** \$24325; **69.** \$5.93; **70.** A \$15—B \$105; **71.** \$5039.14; **72.** \$5.25; **73.** 14 ct.; **74.** \$17610; **75.** 22.375+ rd.; **76.** 11.76+ in.; **77.** C \$70—D \$100; **78.** $\frac{3}{4}$ da.; **79.** \$7743; **80.** 450; **81.** \$10814; **82.** \$14400; **83.** 240 mi.; **84.** 8 $\frac{3}{8}$; **85.** $1\frac{7}{8}$; **86.** \$800— $3\frac{1}{4}$ yr.;

87. \$388.15; **88.** 1.79 + ft.; **89.** 20 min. 6.6 + sec. past 11 A.M.—12 M. June 30; **90.** 3028 $\frac{3}{4}$ gal.; **91.** \$43.74; **92.** 33 a.—42 a.; **93.** 56 bu.; **94.** 466.476 + ft.; **95.** S \$36630—W \$12210—D \$4070; **96.** 100 lb.; **97.** 5 $\frac{1}{4}$ %; **98.** 482.836 + sq. ft.; **99.** 1260; **100.** 60.958 + ft.; **101.** 70 ft.; **102.** 30.9024 sq. ft.; **103.** 36.95 + mi; **104.** \$4500; **105.** 295 rd. 13 $\frac{1}{4}$ ft.; **106.** A \$240—B \$160—C \$240; **107.** 30 a.; **108.** 150 da.—120 da.; **109.** 24 ft.—16 ft.—12 ft.; **110.** 48 min. past 7; **111.** 10 $\frac{1}{4}$ min. past 2; **112.** 71 + ct.; **113.** 180 da.; **114.** \$2000; **115.** 29.556 + ft.; **116.** \$1197.59; **117.** 8.616 + ft.; **118.** 337 $\frac{3}{4}$ %; **119.** \$74.96; **120.** 1st 95 ft.—2d 80 ft.—3d 40 ft.—4th 15 ft.; **121.** 14 %; **122.** 11 lb.; **123.** 5 $\frac{1}{4}$ da.; **124.** Sheep \$5.50—Hogs \$8; **125.** A 9 mo.—B \$800—C 12 mo.; **126.** 16.12 sq. ft.; **127.** 19 $\frac{1}{4}$ a.; **128.** 936 ft.; **129.** C 24 ct.—S 5 $\frac{1}{2}$ ct.—T 35 ct.; **130.** $\frac{1}{4}$; **131.** 30.94 + ft.; **132.** 1 ft. 5 in.; **133.** 32 %; **134.** 4 $\frac{7}{8}$ mo.—June 11; **135.** \$550—July 31; **136.** 1551.04 + sq. ft.; **137.** 58 $\frac{1}{2}$ bu.; **138.** 182 $\frac{1}{2}$ bu.; **139.** 54—96; **140.** 12—16—20; **141.** \$2440.35; **142.** 25733 $\frac{3}{4}$ ft.; **143.** 3 P.M.; **144.** \$10127.205; **145.** 42 ft. 8.1 + in.; **146.** 37 ft. 4 in.; **147.** 1st .92 + in.—2d 1.15 + in.—3d 1.64 + in.—4th 6.29 — in.; **148.** \$103.68; **149.** 90 ft.; **150.** 50 %; **151.** 7 mi.—119 mi.; **152.** 20 $\frac{1}{4}$ %; **153.** \$1440; **154.** 23 hr. 26 min. out—24 hr. 34 min. return; **155.** \$1441.44; **156.** Son \$23040—Dau. \$15360; **157.** 12 $\frac{1}{2}$ ft.; **158.** 12; **159.** 371.8 + sq. ft.; **160.** Store \$7600—Mill \$14200; **161.** \$4000; **162.** \$14595 flour—\$13205 sugar.



To avoid fine, this book should be returned on
or before the date last stamped below

SON-8-40

--	--	--

511.1
M149

615220

